

Hen Harrier Brood Management Trial; midpoint social science evaluation

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Executive summary

Defra's Joint Hen Harrier Action Plan (2016) set out six actions which were agreed can contribute to the recovery of the hen harrier population in England. Action 6 of the plan was 'Trialling a Brood Management Scheme'. Brood management involves removing hen harrier broods from driven grouse moors once breeding numbers reached a density that would significantly impact grouse numbers. Broods are moved to a rearing facility away from the managed moorland. Young are reared in pens, in suitable habitat, until fledging, at which point the birds are tagged and released into the wild.

Natural England subsequently developed a 5-year project to implement Action 6 of the plan, with the following project aims:

Aim: The project will implement a field trial to test the design and help understand the practicalities of a brood management scheme and evaluate its contribution in delivering more hen harriers to the Northern uplands.

Specifically, the trial will test:

1. the practicalities of brood management: can eggs or chicks be taken from the wild and raised in captivity, can those chicks be released back into the wild and the implications for their subsequent behaviour and survival.
2. changes in social attitudes and or behaviours by those involved in upland land management to the presence of hen harriers on grouse moors with a brood management scheme in place.

The aim of this report is to evaluate any changes in social attitudes and or behaviours by those involved in upland management. Specifically, it explores perceptions of attitude and behaviour change thus far (and the dynamics between them) amongst those who have participated directly in the trial.

Reflecting these objectives, the midpoint social science evaluation has sought to answer the following specific evaluation questions:

1. To what extent has the project produced the anticipated outcomes among moorland owners and gamekeepers participating in the trial? Specifically,
 - a. Changes in moor owners' attitudes/behaviours towards hen harriers on grouse moors?
 - b. Changes to keepers' attitudes/behaviours toward hen harriers on grouse moors?
2. What are the main social mechanisms by which outcomes have been produced?
3. Is there any variation in outcomes in different social contexts?
4. How effectively has the trial been delivered? What, if any, changes are required for the future of brood management?

Findings: *Impact evaluation*

The analysis provides evidence that the brood management trial is changing attitudes and behaviours among those grouse moor owners and keepers who have participated in it.

The report identifies that there is recognition of the need and desire for better coexistence with hen harriers on grouse moors and that brood management is perceived to be a tool that can enable this. There is evidence that the trial is improving moorland owners, managers and gamekeepers' views that hen harrier predation of grouse is manageable.

Participants also acknowledge that change in attitudes and behaviours takes time. It is suggested that brood management has been able to tap into and harness a more general recognition of the need to change and coexist with hen harriers', but that different levels of support exist within and across the grouse shooting community.

Participants suggested that the ecological success of the trial and the increasing general hen harrier population during the trial period is evidence of wider attitude and behaviour change beyond those who have directly participated in the trial.

The analysis identifies that the mechanism driving change in attitudes and behaviours among trial participants is the perceived 'safety valve' that brood management provides in terms of preventing hen harriers colonising a grouse moor.

The report provides evidence that moorland owners and managers are concerned that in high densities, hen harriers will overrun grouse moors, making them unprofitable. Perceptions of hen harriers overrunning grouse moors are (in part) driven by reference to the Langholm Moor demonstration project within which a similar process was perceived to have unfolded.

There is evidence to suggest that the availability of brood management allays concerns about hen harriers overrunning grouse moors. It can be inferred from this that it is likely that brood management alleviates this driver of illegal persecution (although we don't have evidence that it does reduce persecution beyond those who participated in the research).

There is support for maintaining brood management as an option beyond the trial period.

The report provides evidence that the Theory of Change underpinning the attitudinal and behavioural change component of the Hen Harrier Brood Management Trial Monitoring and Evaluation Plan (2016) is valid for those who have participated in the trial.

Findings: *Process evaluation*

Analysis identifies that perceptions of trust and legitimacy are vital for successful interpersonal and interorganisational relationships and work in the uplands.

Participation in the brood management trial has strengthened trust between moor owners and keepers and those working on the trial from Natural England, particularly those involved in monitoring harriers on the ground.

However, positive experiences of working on the trial and relationships with NE were explicitly differentiated by those from within the shooting community to their negative experiences of working with NE on other issues in the uplands.

Moor owner and keeper relationships with environmental non-government organisations (ENGOS) and raptor conservation groups were perceived to be relatively unchanged despite their moor's participation in the trial, while there was a perception that NE's relationship with such groups has worsened due to their involvement in the trial.

The financial cost of brood management, together with perceptions of the increasing bureaucracy of the paperwork involved and the scale at which the intervention can be undertaken were all identified as issues requiring consideration in relation to the process of brood management.

The issue of scalability was also linked to concerns about restrictions with regards to where brood managed harriers can be released due to limits placed upon them by Special Protection Area (SPA) designation.

The need for a clearer and improved communication strategy around brood management, its results and related positive stories was raised. It was perceived that most of the information that can be found publicly about the trial is negative and that this may create reticence among moor owners and keepers who have not yet undertaken brood management. The communication strategy may limit the trial's effectiveness in publicising the 'safety valve' effect for grouse moor managers. It may also fail to identify the conservation success of the scheme in improving hen harrier population numbers.

Given the sampling framework and research method adopted we are not able to generalise these conclusions beyond those participating in the trial. Caution must therefore be taken in extrapolating the potential effects of rolling the trial out more widely.

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Introduction

This report outlines the findings of the midpoint social science evaluation of Natural England's Hen Harrier Brood Management Trial. This evaluation was carried out between April 2021 and April 2022 by Natural England social researchers. This social science evaluation provides insight into the impact of the trial on the attitudes and behaviours of moorland owners and managers who have directly participated in the trial. It also provides evidence about the processes involved in the trial and how it has worked in practice. The report is intended to provide the basis for additional social science research on the impact of the trial on attitudinal and behavioural change among wider grouse moor stakeholders. The project also sits alongside ornithological research that is investigating the impact of the trial on the hen harrier population in England as part of the monitoring and evaluation framework.

The Intervention

Defra's Joint Hen Harrier Action Plan (2016) set out six actions which were agreed can contribute to the recovery of the hen harrier population in England. Action 6 of the plan was 'Trialling a Brood Management Scheme'. Brood management involves removing hen harrier broods from driven grouse moors once breeding numbers reached a density that would significantly impact grouse numbers. Broods are moved to a rearing facility away from the managed moorland. Young are reared in pens, in suitable habitat, until fledging, at which point the birds are tagged and released into the wild.

Natural England subsequently developed a 5-year project to implement Action 6 of the plan, with the following project aims:

Aim: The Brood Management project will implement a field trial to test the design and help understand the practicalities of a brood management scheme and evaluate its contribution in delivering more hen harriers to the Northern uplands.

Specifically, the trial will test:

- a) the practicalities of brood management: can eggs or chicks be taken from the wild and raised in captivity, can those chicks be released back into the wild and the implications for their subsequent behaviour and survival.
- b) changes in social attitudes by those involved in upland land management to the presence of hen harriers on grouse moors with a brood management scheme in place.

The trial has established a number of pre-conditions that must be met for hen harriers to be brood managed, specifically:

- Nests can only be managed with the consent of landowners and managers.

- Nests can only be managed where they have the potential to reduce the shootable surplus of grouse, established by:
 - The density of hen harrier population could affect the shootable surplus of grouse (i.e., is another nest within 10km of the nest being considered).
 - There is a grouse shoot on the land and the hen harriers to be managed could have an impact on the shootable surplus of grouse.

As of the writing of this report, five broods of hen harriers have been managed involving seven different grouse shooting estates:

- Broods managed by year: 1 in 2019, 2 in 2020 and 2 in 2021.
- Number of estates involved: 4 estates as brood management intervention sites and 3 estates as receptor sites.
- The trial is supported by the whole Moorland Association membership but only those estates that were eligible for intervention or suitable to be used as release sites have so far participated.

The Need for Social Research

A Hen Harrier Brood Management Trial Monitoring and Evaluation Plan (2016) was developed to support the trial. The plan identified 10 evaluation questions that need to be answered to assess whether the trial has achieved its objectives, of which question 6 focused on the attitudes of grouse moor owners and managers.

Question 6 in the evaluation plan (2016) tests the hypothesis that, as a result of the availability and practice of brood management, grouse moor owners and managers would become more tolerant of hen harriers on their land. A theory of change (figure 1) was developed to specify the process through which the brood management trial could lead to attitude/behaviour change among grouse moor owners and keepers.

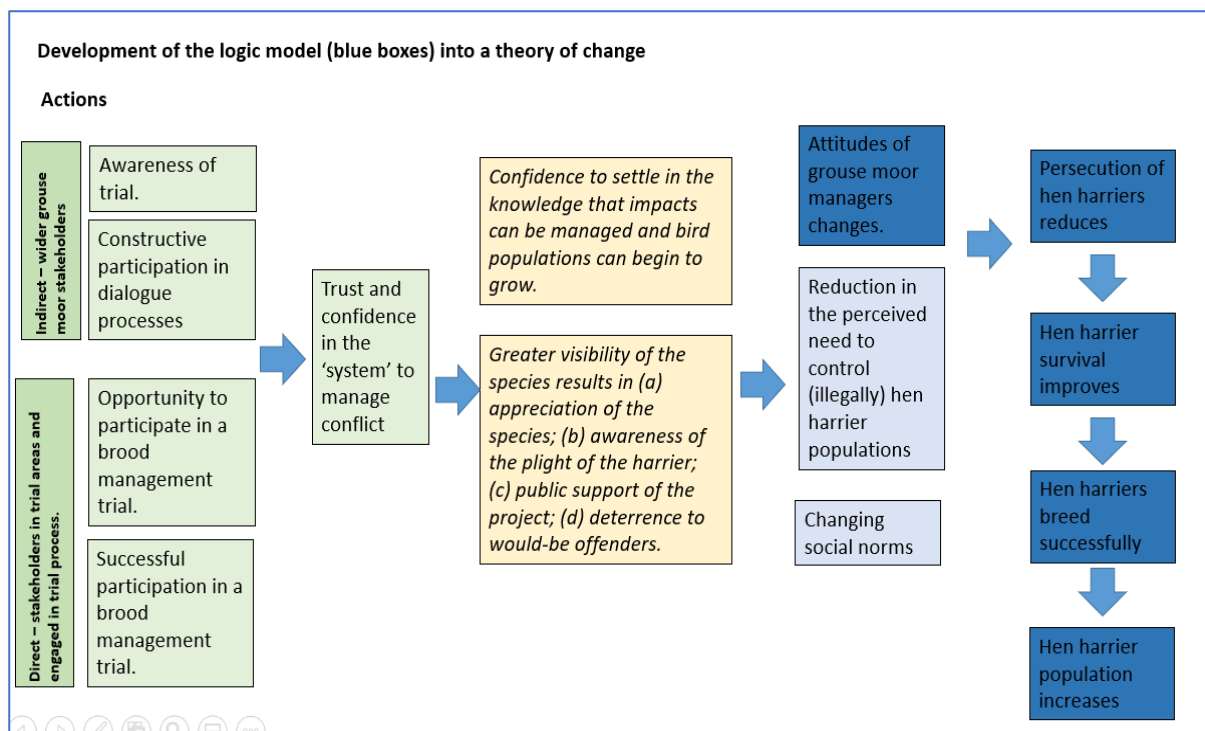


Figure 1. Theory of change for brood management trial.

The plan noted that the brood management scheme will give persons involved in grouse moor management the confidence to coexist with nearby hen harrier nests and a rising national hen harrier population. This is because it provides a “safety valve” that would preserve the economic viability of the grouse moor if local hen harrier nesting density were to increase beyond levels which have been scientifically shown to have an impact on grouse. Attitudinal/behavioural change among persons involved in grouse moor management is therefore a central component of ‘success’ for the brood management trial.

As research question 6 refers to changes in attitudes and behaviours, it requires social scientific research to assess whether the project has achieved its original objectives. Social science research has identified that attitudes and behaviours do not necessarily interact in a linear way (with a change in one leading to a change in the other) (e.g., see Newell, et al., 2015; Shove & Walker, 2007). There is an established body of literature pointing to the gap between individuals’ attitudes, values, beliefs and intentions and their actions, behaviours and practices. This has been explored variously in terms of the attitude-behaviour gap, the value-action gap, the intention-behaviour gap, the knowledge-attitudes-practices gap, and the belief-behaviour gap (Gabler, Butler & Adams, 2013; Grimmer & Miles, 2017; Sheeran & Webb, 2016). Research suggests that an individual’s agency is often limited by social norms, financial and resource constraints as well as wider structural and systemic factors including systems of production and consumption (Reynolds, Subašić, & Tindall, 2015). Therefore, when researching attitude and behaviour change in relation to the brood management trial it is important to capture and analyse data about both attitudes and behaviours as well as the context within which any change is occurring rather than making assumptions about one from data on the other.

Previous quantitative research by St. John et.al., (2018), identified how understanding the value orientations¹ and attitudes of stakeholders helps explain differences in levels of support for management approaches, including brood management. The research also identified that it was important to focus on relationships, deliberation, and trust in addition to exploring co-management interventions. This midpoint social science evaluation of the brood management trial has aimed to consider these components to help identify any attitudinal/behavioural changes that may have occurred during the trial so far among those who have directly participated in it, and the factors that have shaped or inhibited them. It has also sought to identify what has worked well or could be improved or changed in the implementation of the brood management trial.

¹ modes of conduct or qualities of life that we hold dear, such as honesty or freedom, influence people's attitudes and norms, which in turn affect behaviour (St John, 2018).

Evaluation/Research Questions

The objectives of the midpoint social science evaluation of the hen harrier brood management trial were defined as:

1. Clearly define and analyse the sample of interest i.e., who are the key stakeholder organisations and individuals within them who were involved with the development of the trial.
2. Refine and test the theory of change (figure 1, p.11).
3. Explore perceptions of attitude and behaviour change thus far (and the dynamics between them) amongst those who have participated directly in the trial.
4. Explore and agree best available methods (and associated resourcing) to enable the final social science evaluation to be completed.

Reflecting these objectives, the midpoint evaluation has sought to answer the following specific evaluation questions:

1. To what extent has the project produced the anticipated outcomes among moorland owners and gamekeepers participating in the trial? Specifically,
 - a. Changes in managers' attitudes towards hen harriers on grouse moors?
 - b. Changes to keepers' behaviours around hen harriers on grouse moors?
2. What are the main mechanisms by which outcomes have been produced?
3. Is there any variation in outcomes in different contexts?
4. How effectively has the trial been delivered? What, if any, changes are required for the future of brood management?

Methodology

Evaluation Design

For a detailed methodology please see appendix 4.

In accordance with guidance laid out in the Magenta Book (2020), this evaluation has adopted a theory-based approach to the process and impact evaluation of the hen harrier brood management trial. Theory-based approaches are suited for the evaluation of complex interventions or simple interventions in complex environments and are particularly suited to evaluating the brood management trial because they not only account for what has changed as a result of an intervention but also explore the mechanisms through which this change has happened (Astbury, & Leeuw, 2010). The theory-based approach fits well with the purpose of the brood management trial project as the approach is iterative, allowing for the theory of change developed at the inception of the trial to be critically examined and adapted according to findings from the evaluation.

The method adopted here has been informed by the realist evaluation approach (Pawson & Tilly, 1997). Realist evaluation overcomes issues associated with 'black box evaluation', whereby social programs (such as the brood management trial) are viewed primarily in terms of effects (change in attitude or behaviour to hen harriers), with little attention paid to how those effects are produced (Astbury, & Leeuw, 2010). The realist approach taken in this study has sought to "unpack" the black box so that not only can the evaluation address the effects of a programme, but also the inner workings and operations of its components and how they are connected (Kazi, 2003)

Reflecting realist principles, evaluation design has been driven by the requirement to test and refine the theory of change and explore attitude and or behaviour change among those that have participated in the trial. This means that engaging with individuals involved in the trial, either as staff working on the project within Natural England or other organisations, or moorland managers and keepers on the moors involved in the trial. To achieve this, a qualitative semi structured interview design was adopted. This design was chosen as it is recognised that qualitative interviews with participants to uncover implicit assumptions about how a program works links well with white box evaluation and a realist approach (Astbury, & Leeuw, 2010). A qualitative semi structured interview approach also enables flexibility in data gathering (e.g., technology, location) that can help increase participation as well as offering flexibility in subsequent data analysis (deductive and inductive) that sits well with testing and refining the trial's theory of change.

Sampling

In both quantitative and qualitative studies, researchers must decide the number of participants to select (i.e., sample size) and how to select these sample members (i.e., sampling scheme) (Onwuegbuzie & Collins, 2007). Given the qualitative focus of the research, the research used the concept “information power” as a guide to adequate sample size (Malterud, Siersma & Guassora, 2016). Information power indicates that the more information the sample holds, relevant for the actual study, the lower number of participants is needed. Malterud, Siersma & Guassora (2016) suggest that the size of a sample with sufficient information power depends on (a) the aim of the study (with the more focused the aim the smaller the sample needed), (b) sample specificity (the greater the specificity of experiences, knowledge, or properties among the participants included in the sample the smaller the size needed), (c) use of established theory (a study supported by specific theories for planning and analysis requires a smaller sample), (d) quality of dialogue (a study with strong and clear communication between researcher and participants requires fewer participants to offer sufficient information power), and (e) analysis strategy (a project seeking in-depth analysis of narratives from a few, selected participants would require smaller sample for sufficient information power). Using the concept of information power to inform sample size recognises that meaning is generated through interpretation of, not excavated from, data (Braun & Clark, 2021). Therefore, judgements about when to stop data collection were linked to discussions among the researchers about the developing analysis and its ability to address questions associated with the purpose of the research.

This review and reflection process resulted in a total sample size of 19 being deemed sufficient for obtaining information power. This sample were identified and chosen using a purposive sampling strategy (Robinson, 2014) whereby those individuals perceived as best suited to providing information about the topic of investigation are identified and then sampled from. The project board of the brood management trial provided a list of names all those that had participated in or worked on the trail. The research team then approached Natural England staff on the list directly to enquire if they would be willing to participate. A project board member then approached those on the list external to Natural England to ask if they would be willing to participate. The contact details of those that agreed were then passed onto the research team who approached them about participation.

The final sample consists of 7 staff from within Natural England who have had direct involvement in the trial as well as 12 individuals from outside Natural England who have directly participated in the trial in some capacity, including moorland owners, gamekeepers, individuals employed to assist in the licensing process and those involved in the brood management itself. The specific breakdown of the different roles of the 12 external participants will not be included for ethical purposes (protection of anonymity), which will be discussed later in this chapter, but analysis will indicate their role or organisational affiliation where quotations are used.

Interviews

Interviews took place between July and November 2021. Researchers divided the data gathering between them with one member interviewing staff from within NE about their thoughts and experiences of the brood management trial and the other two interviewing those who had participated in the trial (as owners and keepers on moors where hen harriers had been removed, or who had acted as receptor sites for the release of brood managed harriers as well as those who had involvement in the rearing and release of the harriers or with the licensing and identification of receptor sites). Interviews were conducted either via the use of Microsoft Teams or by phone with the full audio being recorded (see ethics and analysis sections for more detail) for transcription and analysis purposes.

Analysis

Given the purpose of the research to both test and refine the theory of change as well as capture perceptions of any attitudinal and/or behavioural change among those who participated in the trial, the choice of analytical method needed to allow for both deductive and inductive analysis (Roberts, Dowell, & Nie, 2019). Template Analysis (Brooks et al., 2015) was chosen as it sits somewhere in between positivist orientated approaches to qualitative research and interpretivist ones (Braun & Clarke, 2019) and is therefore well suited to the project's realist framing. It also allows for a collaborative approach to qualitative analysis enabling sense checking between researchers as well as the provision of thick description and both deductive a priori coding, and inductive coding.

Template analysis sets out key procedural steps (6 steps in total) for researchers to follow (Brooks et al., 2015). In line with O'Connor and Joffe (2020) the process first involved the independent coding of a small amount of data (three interviews one NE staff member, one moor owner and one keeper) by each of the research team before a meeting was arranged and the codes and data discussed to allow informal comparison of codes and initial themes to be explored and developed. This led to the development of an initial codebook, which was reapplied by the first author to the initial three interviews. The codebook and data captured by it were then further reviewed and discussed between the research team to further refine the codebook before it was then applied by the first author to the remaining larger set of data. The code book included a miscellaneous theme to allow data that didn't appear to fit within the codebook to be captured and raised with the rest of the team. New themes were either then created to capture these data or existing themes were reviewed and refined to incorporate it.

Limitations of the method

It is important for an evaluation to reflect on the limitations of the method employed, and any potential implications this has for conclusions that can be drawn from the evidence.

Reflecting the rigour of the sampling and analysis employed, confidence can be placed in the conclusions drawn.

However, it is important to recognise a number of potential limitations of this study. First, although the researchers are not part of the project delivery team, their affiliation with Natural England may have limited respondents' willingness to be open and honest about their experiences of the trial. Second, to provide evidence for the process evaluation, the sample is limited only to those who have been delivering or participating in the trial. There have only been a limited number of grouse moors on which the density threshold for using brood management has been met as well as receptor sites assessed as suitable for harrier release within the same SPA. This has resulted in the comparatively small sample size in this research compared to the total number of grouse moors and people involved in grouse shooting. As such, participants are likely to be among those members of the moorland management community who are most receptive to the idea of brood management and who recognise the need to change attitudes and behaviours. Caution must therefore be taken in extrapolating the potential effects of rolling the trial out more widely and concluding that the trial has had a similar impact on the wider grouse shooting community. The Natural England report NECR615 Brood Management social science report was developed to address this limitation and should be read in conjunction with this report.

Findings

Analytical structure

The interview data were thematically analysed using template analysis (Brooks et al., 2015) and organised through the creation of a code book to form a narrative account of participants' experiences of the trial. The structure of the analysis derived from the codebook was developed to enable analysis of participant perceptions of the processes involved in the trial, the impact of the trial on attitudes and behaviour and the wider contextual factors that frame these experiences. The extracts from the qualitative data presented were selected for their representativeness within the relevant thematic category with the use of n= signifying how many of the 19 participants had data coded from their interviews as part of that theme. For example, n=12 after the theme heading means that 12 of the 19 participants had extracts of their interview coded as relevant to that theme. Each interviewee may have had multiple extracts of data coded to a single theme. The analysis consists of five component parts.

1. Background context relevant to evaluating the brood management trial: This provides an overarching context to both evaluation objectives.
2. The theory of change: addresses objective 1 and questions 2 and 3.
3. Process evaluation: addresses questions 2, 3 and 4.
4. Impact evaluation: addresses objective 2 and questions 1a and 1b, 2 and 3.
5. Additional considerations for brood management and hen harrier conflict reduction: addresses objectives 1 and 2 as well as questions 2, 3 and 4.

An important point to note is that many of the issues raised and addressed are cross-cutting and as such the analysis and its constituent parts should be read holistically rather than in isolation.

Part 1. Background context relevant to evaluating the brood management trial

Theme 1: The history of conflict around harriers on the uplands

This theme captures discussions about how brood management has developed within a context of conflict around grouse shooting. A perception exists among those interviewed who work on or for grouse moors that hen harriers have become symbolic of the polarisation between those that want to ban shooting and those that don't. Because of this polarisation, there is a sense that the wider role that grouse moors may play in terms of

positive contributions to conservation in the uplands is ignored. These two factors have created apprehension among those working on or for grouse moors about participating in the trial. Participants in the trial expressed concern about the possible negative attention participation might create from those opposed to shooting. They were also concerned that if brood management was to be stopped for whatever reason, then grouse moors would be left facing a situation in which they had helped to create harrier colonies on grouse moors which would impact negatively on their livelihoods.

1.1 A drive to ban shooting (n=5)

This subtheme highlights a view discussed by moor owners, keepers and others employed by shooting interests in the uplands that while persecution has and does occur and that grouse moors need to do more to support harriers, conflict between different groups and organisations is more about banning shooting and that harrier conservation is secondary to this. In relation to persecution, a moor owner noted that,

“Clearly, we weren't being as accommodating as we could be on the small amount of habitat they had left particularly as we are to other ground nesting birds like curlew, lapwings and others that have been probably accommodated better than the harriers had” (UL02).

Despite this recognition, those participants working within the grouse shooting industry were explicit in their view that they felt conflict between groups was less about hen harriers and more about banning grouse shooting. Within this wider conflict around banning shooting harriers had an important symbolic value. For example, an interviewee who worked with grouse moors noted how they felt that,

“The relationship with the conservation bodies it's not about, for me personally how I feel, it's not about more hen harriers, it's about less shooting, that's what their ultimate goal is, less shooting. Hen harriers are something that the shooting industry will get beaten back with all the time and even if we get to a point where we have you know, say we'll get to that point of 300 pairs, that will not be enough it will never be enough because shooting is not liked by a lot of people and certainly a lot of conservation bodies” (UL09).

Within this framing of the focus of the conflict as being between different groups and values, there was acknowledgement by those interviewees within the shooting sector that hen harriers had and do face persecution on some grouse moors but that to try and ban all grouse shooting on all moors because of this was unfair. For example, an interviewee who helped to look after brood management release sites noted,

“I mean, yes, there has been persecution, and nobody could deny that, but I mean, to ban, for these organisations to want to completely ban grouse shooting. It's like saying we have millions of drivers in this country and say 5000 have been convicted on speeding what we want to do is penalise everybody and we're going to ban

everyone from driving. You know, the world's not perfect, and you're always going to get people that break the law unfortunately" (UL07).

1.2 The role of grouse moors in conservation and maintaining ecological "balance" on the uplands (n=11).

This sub-theme highlights a perception on behalf of the moorland community that grouse moors contribute to conservation and concern from within the grouse shooting world that if moors are not managed for grouse, then it will damage habitat and impact ecological balance. The idea that grouse moors make a positive contribution to conservation in the uplands through the management practices of game keepers and that those within the shooting community would call themselves conservationists was acknowledged by Natural England staff, for example,

"There's plenty of gamekeepers who call themselves conservationists. You want to go and see any Curlew in this country, big numbers of breeding waders, you go to somewhere that's a grouse moor. So, they would say, that, you know, they're doing a lot of conservation work" (NE01).

Natural England staff also identified that if some of the practices involved in grouse moor keeping were to be stopped, then rather than leading to a simple increase in harrier numbers, it might result in different problems. For example, harrier predation from other predators that keeper's control as part of their work to protect grouse. An NE staff member explained their view that solutions to hen harrier conservation needed to involve grouse moors,

"What's going to happen to that land if it's just left, you're not going to have harriers on it. You are not going to have much of anything. Where's the best place for harrier's and hen harrier conservation, on grouse moors. Without a doubt, that's where they want to be. And that's where the food is. That's where the habitat is. So, conservation for hen harriers has to start there" (NE03).

Keepers argued that grouse shooting helped sustain their wider conservation work by paying their wages. They used this to counter arguments to ban shooting. For example, a keeper explained,

'When I was a child, I was actually quite anti shooting because I was into birdwatching. But over the years, I evaluated it from both sides, whether it was anti shooting or pro shooting, and my conclusion is providing that it is done sustainably, and with conservation in mind, there's absolutely nothing wrong with it. And a lot of the methods of predator control have changed because there's a lot of people perhaps don't like to see foxes killed. But in actual fact, there's only a relatively few species of birds and mammals that you're actually controlling and the benefits to the general wildlife populations colossal' (UL07).

Participants from the grouse shooting sector expressed their concern about the lack of acknowledgement of the conservation benefits of grouse moor management and about how a drive to ban shooting could lead to degradation of habitat suitable for both hen harriers and other species. A grouse moor owner explained,

“I'd say, we are an area that that is, you know, comparatively by UK standards, exceptionally wildlife rich. And there is always room for improvement and I'm passionate about trying to achieve that. But improving on what we have, rather than what I slightly fear at the moment in terms of policy, is going to be a sort of fairly chaotic destruction of what we have, without a very clear view on what the improvements are going to be” (UL10).

1.3 Considerations / reservations about participating in the trial (n=6).

The context of conflict discussed in 1.1 and 1.2 created concerns among some in the grouse shooting fraternity who were interviewed about participation in the brood management trial. These concerns revolved around being attacked by certain interest groups who they felt want to ban shooting and for whom brood management was not a popular practice. As one keeper explained,

“We had the first nest of Harriers released on our site. Yeah, obviously quite apprehensive, not knowing what it all entails being the first release site. I mean, apprehension was probably more so the, the media hype, the twitcher hype. Just not knowing if you were going to get descended with anti-brood management people, rather than about the grouse. Obviously, when the young fledglings are released, they're not going to give us any hassle on grouse numbers that season” (UL11).

Another example of participant anxiety focuses on future decisions and the permanency of brood management. A grouse moor owner noted that,

“When it came to the crunch, and the trial was approved, and, you know, they were looking for receptor sites and that was obviously, quite terrifying. And even now, it's still a trial. So, you know, we don't know that sort of the rug won't be pulled” (UL10).

Part 2. The Theory of Change

One of the key objectives of this project was to refine and test the Theory of Change (see fig 1. P.10) incorporated within the Monitoring and Evaluation Plan (2016). The Theory of Change specified the process through which the brood management trial could lead to attitude/behaviour change among grouse moor owners and keepers which would reduce persecution and lead to increases in harrier numbers.

The Theory of Change hypothesises both a direct and indirect route to attitude and behaviour change. The direct route specifies that participation in the brood management trial will improve trust and confidence in the 'system' to manage conflict. In turn, this will lead to a reduction in the perceived need to illegally control hen harrier populations among moorland owners and managers. The indirect route hypothesises that awareness of the trial and engagement between those who have and have not participated in the trial will contribute to wider attitude and behaviour change. The current project is only able to address aspects of this indirect route through analysis presented in part 3 of the findings (subtheme 4.4 the need for a communication and engagement strategy) and part 4 (subtheme 5.2 the mechanisms of change). However, the issues raised about the indirect route of the Theory of Change in these components is provisional and requires testing, exploration and expansion through further specific social science research on this indirect route to behaviour and attitude change.

Theme 2: The spectre of Langholm

The action plan (2016) suggested that the brood management scheme will give persons involved in grouse moor management the confidence to coexist with nearby hen harrier nests and a rising national hen harrier population. This will be achieved by providing a "safety valve" that would preserve the economic viability of the grouse moor if local hen harrier nesting density were to increase beyond levels which have been scientifically shown to have an impact on grouse. This report provides evidence that moorland owners and managers are concerned that in high densities, hen harriers will overrun grouse moors, making them unprofitable. Perceptions of hen harriers overrunning grouse moors are (in part) driven by reference to the Langholm Moor Demonstration Project within which a similar process was perceived to have unfolded. For example, a grouse moor owner explained that,

"I think there's an absolute very justifiable fear by probably everyone involved in grouse moor management that if you had a pair of hen harriers, it wouldn't just be a pair which many people like seeing it would increase to a colony. I think the Langholm Moor Demonstration Project, Joint Raptor Study and so on, you know, that really you know, demonstrated, and supported the fears that people had that where hen harriers built up into a colony, grouse shooting wasn't viable, the keepers lose their jobs and habitat management stops" (UL10).

The evidence in this report suggests that by acting as a tool to relieve pressure on grouse moors where there is a high density of hen harriers, brood management helps allay owners/managers' concerns about hen harriers overrunning the moors. We can infer from this that it is likely that brood management alleviates the drivers of illegal persecution (although we don't have evidence that it does reduce illegal persecution beyond those who participated in the research). In this respect, we have some evidence that the Theory of Change is valid, but we can't extrapolate this beyond people directly involved in the trial. Furthermore, the analysis provides greater context to the Theory of Change by providing more detail about how participants perceive the 'safety valve' of brood management as leading to attitude and behaviour change. The 'safety valve' can be better understood in terms of mitigation, pressure relief and the provision of a legal alternative for managing impacts of harriers on grouse. These will now be explored in more depth.

2.1 Brood management as mitigation tool against colonisation (n=10).

As a mitigation tool, brood management was viewed as a means for avoiding hen harrier colonisation, as was perceived to have occurred at Langholm, as it enabled keepers and owners to remove nests if the density threshold was met. By acting as a mitigation tool, it increased acceptance of harriers on moors by providing confidence that colonisation could be avoided. As a Natural England participant explained,

"Langholm was always that thing, they have said to me over the years, alright, you know, you might have one pair, two pairs, but then what happens when you've got ten pairs? Are you going to come up and tell me, you know, that I haven't got a job anymore? You know. So it is, even though it's a wonderful enigmatic species, it is a species that in high densities can take livelihoods away. And that's something you know; we have to consider. So, yeah, that's one thing you know. So, one of the purposes is to get hen harriers into a favorable conservation status, and something we've been trying to do for many years. And I think that is how it's going to achieve its purpose, by giving the gamekeepers the safety net they need, then allowing the species to consolidate" (NE07).

This idea of brood management acting as a mitigation tool was supported by owners and keepers who discussed how it would allow the impact of harriers to be shared over a greater area. For example, a keeper explained,

"Obviously, a breeding pair and breeding colony, if set up, that's going to have an impact. But obviously, that's why we support brood management to spread the numbers and try and reduce as many colonies, but spread the numbers over the north of England" (UL11).

Furthermore, it was the fact that brood management hadn't been a part of what had been tried in the Langholm Moor Demonstration Project that made it attractive to those in the grouse shooting industry and therefore increased their support for the trial. For example, a moor owner explained,

“That's why I feel very strongly that the brood management trial is a way that we've all got to work to go ahead because that wasn't part of the Langholm trial” (UL02).

2.2 Brood management a tool to relieve pressure and create balance (n=8).

Reference was also made to the pressure grouse moors and gamekeepers are under to produce enough grouse to make driven grouse shooting financially viable. One of the ways in which they traditionally do this is through predator control to prevent grouse predation. Hen harriers predate on grouse and at certain densities can have a detrimental impact on overall numbers, meaning they are perceived as a part of this pressure. By engaging in brood management our evidence suggests the pressure felt from hen harriers is alleviated. As a person working on the trial explained,

“We have got to find out in this trial, and I'm glad to say we are finding out, whether it's feasible to deal with Harrier hotspots. I don't know how much about you know about Harriers but they're not particularly territorial. They don't seem fussed at all to rub shoulders with other Harriers. You can create hotspots. Now clearly hotspots can be a problem. Because three or four hairier nests cheek by jowl does put a heck of a pressure on everything that lives in and around that area. Now, the point of the trial is this, is it possible to relieve pressure? So far it would appear to be the case, yes, we are able to” (UL03).

Brood management was also discussed as a tool that helps create balance between harriers and other species, including grouse, so that a type of equilibrium that benefits the diverse range of animals found on moors can be maintained by keepers because grouse numbers are sustainable, and shooting can continue to pay for their work. As a grouse moor owner explained,

“My personal view of where I hope this can go is this, I hope we can find a balance, where we have active hen harriers, for people to come in and enjoy and see on the moor. And we can have a surplus number of red grouse which allows moors to pay for all the keepers that do all the habitat and predation work through selling driven grouse shooting days as well. So that's the balance I'm hoping to get to, personally, and that's what I'm trying to work to and that might not be what the trial was set up for, but that's what I'm hoping. That the trial can work as a conservation tool that can be used to achieve that balance” (UL02).

2.3 Brood management as a legal tool for managing harriers (n=8).

Explanations about the purpose of the brood management trial and how it could act as a safety valve for moors, therefore promoting behaviour change and co-existence, were also discussed in terms of how it provides a legal means to manage harriers. By providing a legal remedy to address the impact harriers could have on grouse moors it was suggested

that it could prevent people undertaking illegal remedies thereby reducing persecution. A moor owner discussed the context in which such illegal behaviour may happen and the way in which brood management changes this context and therefore the associated behaviour,

“I think it's had a very positive impact. Yeah, I think undoubtedly, it couldn't be more so. I mean, I'm not a gamekeeper but you know, if I was, if we'd had a big crash in grouse and numbers were at a very low level, which, inevitably, will happen again, and we had even one pair of hen harriers, I would still be nervous. In some cases, you know, a keeper with a small moor is married, young family, lives in a tied house, you know, doesn't have many grouse, you know, if someone in that situation generally feels that their livelihood is threatened, and their family home and so on, you know, doing something illegal is wrong, it's not right, but I can understand why and I am not going to judge them harshly you know, if they go and do something. But by having the trial. And certainly, if there's confidence in it being an ongoing conservation tool, it really takes away the, you know, the rationale behind that thought process that keepers might go through. It gives us a great ability to, you know, show, tell, demonstrate to people why they absolutely must not break the law” (UL10).

Part 3. Process Evaluation Findings

Theme 3: Interpersonal and Interorganisational Relationships

This theme looks to unpick the processes involved in delivering the trial that relate to how it operated and worked in practice. It encompasses aspects relating to perceptions about relationships between people and between people and organisations during the trial. It captures participant discussion of issues such as the importance of trust between those working on the trial, what has worked well within these relationships and ways of working, what hasn't worked well and why. It also examines how brood management has impacted upon relationships and the implications of these relationships for future conflict management in the uplands.

Analysis identified that perceptions of trust and legitimacy are vital for successful interpersonal and interorganisational relationships and work in the uplands. Participation in the brood management trial has strengthened trust between moor owners and keepers and those working on the trial from Natural England, particularly those involved in monitoring harriers on the ground. However, positive experiences of working on the trial and relationships with NE were explicitly differentiated, by those from within the shooting community, from their negative experiences of working with NE on other issues in the uplands. There was also a sense that there are tensions internal to NE around the trial that can affect work on the trial. It was perceived that positive relationships between those grouse moors involved in the trial and those not, helped the former address any concerns raised by the latter, particularly around location of receptor sites. Moor owner and keeper relationships with environmental non-government organisations (ENGOS) and raptor conservation groups (RCG) were perceived to be relatively unchanged despite participation in the trial. There was also a perception that NE's relationship with such groups has worsened due to their involvement in the trial.

3.1 Relationships (Trust and legitimacy) needed for success (n=6).

This subtheme identifies the role that trust has played at both an individual and organisational level, in delivering brood management on grouse moors on the uplands. Trust was perceived as a vital part of good interpersonal relationships through which Natural England staff and game keepers could work productively together on the ground to conserve hen harriers. For example, a NE member of staff explained how relationships of trust built with keepers meant that keepers were more forthcoming with information about harriers that was useful for their protection,

“A head keeper from not far away called me up and said we have a harrier nest for you. He said you better get up here he said, because there's a bunch of bloody

botanists walking up and down looking for rare plants and if they disturb it, and it goes, I'll only get the bloody blame. So, for me the fact that that gamekeeper trusted me with that information, and he's a head keeper meant an awful lot" (NE07).

Building on this theme of the importance of trust between gamekeepers and Natural England staff, a keeper explained how it was important that they had time to get to know Natural England staff, to build rapport and trust. They explained how overcoming preconceptions about each other was important to see past a label and get to know the person,

"I think we've got a good relationship with Natural England, well with those lads on the ground who have been very helpful and very honest. But at the start like we we're a little bit wary as everyone paints such a negative picture of managed moors so you are a little bit standoffish till you get to know someone" (UL04).

Another NE staff member explained the importance of relationships built on trust for the success of both brood management and harrier conservation more generally. They explained how trust enabled honest conversations to occur and allowed the sharing of divergent views as well as identified how it is important to get to know each moor, owner, or keeper rather than treat them as a homogenous whole,

"It's all down to personal relationships, it's all down to trust, now they're able to say things to us and we're able to say things to them and we are able to work together and say look these are the facts this is where it is. This is what we have to do. This is what we're trying to do. All grouse estates are their own little entities. You know they are all different, some of them out and out hostile, other ones are friendly and accepting and everything in between" (NE03).

Trust was also discussed as an important factor for those working with each other on brood management from within the same organisation or interest group. For example, a NE staff member discussed how they felt that there were inter-organisational tensions around brood management within Natural England that could at times make working on the trial uncomfortable,

"There's a lack of trust, even within our organisation, about brood management. So, I detected a quite distinct distrust between different colleagues about motivations about what's going on. And I have no way of evaluating who was right whether they were paranoid or what, but it just wasn't very comfortable. Talking to one set of people and then another set of people who were not necessarily seeing eye to eye" (NE05).

By contrast, trust between moors was seen as a vital part of successfully rolling out brood management. This was particularly so with moors neighboring those that acted as receptor sites for brood managed harrier release. A moor owner explained how good interpersonal

relationships at both keeper and owner level were important for alleviating concerns about harriers being released nearby,

“You know, obviously, we had a situation, you know, that the birds actually having been released at xx end up heading off and away and spend most of the time hunting over someone else’s moor, so they probably feel that they have had an impact. But we have been able to talk about it. They are our neighbours and friends, and we have good relationships. So, it was just, you know, talked about and pointed out” (UL10).

3.2 The process of participation (n=11)

This subtheme follows on from the theme of trust and focusses on discussions about what has been good or bad about ways of working on the ground during brood management. While strong interpersonal relationships which build trust between NE staff and moors (owners, keepers) were seen as vital to successful working, interviewees also discussed how participating in the trial had actually helped strengthen those relationships and led to greater trust. For example, an NE staff member explained how,

“I’ve always been in a good place with the keepers. But this brood management has pushed me even higher. I’m almost on Christmas card lists now. Because if you’d like and a lot of keepers have said this to me specifically, you know, you guys have put yourselves on the line with this one. It’s you like you know; they know the stick we’re getting over it” (NE07).

A moor owner also described how working with others on the ground to deliver brood management has had a positive impact on their relationships. They also explained how they felt their experience of working on the trial was different to that they expected and have experienced in relation to other issues. They explained how,

“As its developed, you know, I’ve made real friendships and had many enjoyable times, you know, working with people from totally sort of non-shooting, and who, in many cases are probably quite ideologically opposed to shooting, you know, scientists with great integrity, and, you know, they and we can put all that sort of thing one side. Brood management is the one thing that just totally stands out as Natural England being brave” (UL10).

A perception existed among those within the grouse shooting community as well as from some staff within Natural England that the ways of working and the relationships built throughout the brood management trial were particularly positive and key to success. This was often contrasted to experiences of working together on other issues. In this sense the work between Natural England and grouse moors on the brood management trial was held up as a model of good practice. For example, a NE staff member explained how a generally high turnover in NE staff has negatively impacted on wider relationship building and thus ways of working in the uplands. In this sense it was suggested that the benefits of

interpersonal relationships and the importance of trust for conservation work in the uplands are sometimes not fully appreciated,

“I do think the grouse moor owners feel there's a few trusted people within NE ranks and they are a group of people who work on trust. But there's been that much of a turnover with staff in the uplands and elsewhere that it takes at least a few years for a lot of these people in these rural backdrops to get to know people and trust them. You know, I had seen you know, a lot of the keepers I got to work with originally, they knew me from old, so I'd broken the ice with them. But there's a lot of ice breaking going on now out there between grouse moor owners, and our new advisors and stuff” (NE07).

This was reflected in discussions with keepers and owners who contrasted their relationship with NE staff on the ground during the brood management trial to their experiences with NE more generally. In this way brood management was seen as something that had been developed collaboratively and within which they had been listened to, which they suggested they felt was often not the case for other issues. For example, a keeper explained,

“I mean, like I said before with the field workers on the ground who are similar thinking to what we are. So that works. If NE has more field workers or officers and people within the structure of Natural England that actually knew what was going on, on the ground, then it would make for a better Natural England because everything just seems to be against us. They're not, they're not working with us, it's like, no we will ban this, ban that, will stop them doing this, will stop from doing that. There's no positive that comes out of it. It's all negative” (UL11).

3.3 Natural England's wider relationship with upland managers/keepers and ways of working in the uplands (n=9).

This sense of contrast between the experience of the brood management trial and experiences of working with Natural England on other issues in the uplands was made apparent when interviewees were asked to discuss their views on the relationship between Natural England and grouse moors more generally. A NE staff member explained how other issues in the uplands could negatively impact upon working relationships with people around hen harriers,

“Natural England is a big old monster. They are into everything. I mean if I go into somewhere and I just bump into a farmer, straightaways they have got a gripe, he's got a problem. Something to do with subsidies or whatever, and they say it is Natural England stopping them from doing something or they're not quick enough to do something else or whatever, so you get that on every, right across the board, no matter who they are, no matter what role or what kind of land management it is. So, yeah there's issues that can affect me that have got nothing to do with me” (NE03).

Interestingly, interviewees involved in grouse shooting were able to disentangle the positive experiences they had had from working on the brood management trial with Natural England from their more general experiences and views of Natural England. As a moor owner explained,

“Brood management is the one thing that just totally stands out as Natural England, working with, being brave, you know, actually trying to defend something that's worth defending in terms of our upland wildlife, and I would say it is totally at odds, and I hate having to say this. But yeah, I mean, just the distrust and lack of confidence among moorland managers owners, as I'd say, is close to 100%” (UL10).

3.4 Relationships with Environmental Non-Government Organisations (ENGOS) and raptor conservation groups (n=9)

This subtheme looks at perceptions about the impact that participation in the brood management trial has had on both grouse moor and NE relationships with ENGOS. It identifies that there has been a lot of negative publicity around brood management and that the term brood meddling is often used by those who hold negative views of it. It was suggested by some that this opposition is linked to perceptions that certain groups are more interested in banning shooting than harrier conservation and that is why both grouse moor and NE participation in the trial has not been supported by some groups.

In relation to Natural England's role in the development and ownership of the trial, NE staff discussed their perception that it has led to certain groups claiming that the organisation works at the behest of the grouse shooting industry and that this is making working relationships with some groups more difficult. In discussing the impact that NE's participation in the trial has had on relationships with certain groups an NE staff member explained,

“I think what it may have done is turn some of them, they perceive us, Natural England, as being in bed with those people. So, it may not [BM] have changed their attitude towards gamekeepers, but I think it will have may have changed their attitude towards us” (NE01).

Keepers doubted that their involvement in brood management would alter prevailing criticism of their role, for example,

“I speak to quite a lot of raptor workers and, you know, people that aren't involved in shooting, I have a broad range of friends, and I think everyone's got the right to their opinion. But I think the attitudes towards gamekeepers, I think we do a lot of good work already, which they don't acknowledge so I can't see them acknowledging this as good work really? But I hope I'm proven wrong, it can't all be negative, but they very rarely put anything positive about it” (UL05).

Building relationships between different interest groups and organisations was identified as important for the future sustainability of both grouse moors and harriers. As a grouse moor owner explained,

“I think when we all discuss it, we actually find as I said, we're really not that far apart. But it's when there's particular self interest groups when they just won't sit round. They want to just push that one bit of self-interest, they keep trying to find something wrong, so that they told you so. And that's on both sides. Yeah, if we all sit around, discuss a little bit, we're definitely doing much better” (UL02).

Theme 4: Issues with the trial and considerations for the future of BM

This theme refers to perceptions about what has or hasn't worked well during the trial and why. It captures a range of topics that participants identified that they felt could/should be changed or which require attention if the trial is to continue or become permanent in the future. Issues around the cost of brood management, the increasing bureaucracy of the paperwork involved and the scale at which it can be undertaken were all raised by participants. The issue of scalability was also linked to concerns about restrictions in terms of where brood managed harriers can be released due to limits placed upon them by special protection area (SPA) designation. Ways of working within Natural England were also discussed, and it was suggested that a more unambiguous corporate position in support of brood management would help. Resource requirements to enable NE to effectively deliver brood management and hen harrier monitoring on the ground were also raised as was the need for greater focus on engagement work and building trust in interpersonal relationships on the uplands. The need for a clearer and improved communication strategy around the trial, its results and positive stories was raised. The perception was held that most of the information that can be found publicly about the trial is negative and that this may create reticence among moor owners and keepers who have not yet undertaken brood management.

4.1 Sustainability of brood management procedures and practices (n=12).

Discussions around sustainability of the trial primarily focused on issues such as the financial cost of brood management, the level of security required and its relationship to cost, the paperwork involved in licensing brood management and issues about future scalability. In relation to the financial costs involved, issues associated with tagging and monitoring and security were most commonly raised. A moor owner discussed their concern that if brood management is to continue beyond the trial, then costs need to be

considered, as those incurred during the trial could potentially dissuade moors from undertaking brood management in the future. They explained how,

“On cost, the cost for the MA [Moorland Association] for doing one receptor site is something in the region of £40,000 when you take everything on board. And then yes, if you’re a moor, and you got a second hen harrier site, I mean, that’s effectively, what is it, four days of driven grouse shooting or some sort of 400 brace of grouse, so they will probably weigh that up and say, actually, I’m just going to leave them be for 40 grand, that’s too expensive for me. So, if that could come down something more reasonable, like 10,000-pound cost, I could see a moor, at the moment the MA is picking up all the costs for doing this trial. We’re sort of the basically the owners have effectively clubbed together to pay for this to happen, rather than individual owners having to pick up the tab. But if that’s given, that’s not feasible, forever going on. So, at some stage, each moor is going to have to become responsible for their own decision as to whether to go ahead with brood management or not. Yeah, I think that for it to be feasible it is going to have to be simpler and a more cost-effective solution” (UL02).

There were also discussions about the paperwork involved in applying for a license for brood management and the perception that this had become more complicated and time-consuming throughout the trial and that this could negatively impact upon moors engaging in brood management in the future. A grouse moor owner explained that,

“From the first year, the paperwork perhaps for the trial has got a bit more complicated as obviously, people have sought to attack the scheme and tried to find ways that it’s not working. Clearly the paperwork has had to become even more detailed to show that that isn’t the case. I’ve seen that get weightier, having somebody to sort out all the paperwork is important, so it is not putting pressure on you. So, if you can take the burden off the moor so that all they are doing is helping provide a home and not being asked too many other things then that works, it’s trying not to make the whole thing too burdensome and onerous” (UL02).

The other issue that was raised by interviewees was the scale at which brood management could operate. It was noted that the greater the number of harriers in the future, the potentially greater demand for brood management there might be, but there was a point at which this would become impractical and therefore the future sustainability of brood management was brought into question. For example, an individual working on the trial explained how,

“I do think there are aspects of brood management that have not really been considered at this point. Probably the most significant one is the numbers game. This has proved more successful than I thought it would do in terms of how the birds survive in the wild once we release them. And that point, if the people who started at the outset talking about, saying that we should have at least up to 300 pairs of hen harriers in the wild. That’s an awful lot of brood management. Once the

numbers increase, there's going to be a lot more nests that are within the 10-kilometer distance that are going to require brood management, and it does worry me that nobody's really thought about that. So, I do think that has not really been looked at this point. But maybe because it's a trial that didn't need to be looked at" (UL12).

4.2 Issues for consideration about the future sustainability of brood management (n=8).

This theme examines other issues that were discussed in relation to the future sustainability of brood management. In relation to the issue of scale discussed in 4.1, the requirement to release harriers back into the same Special Protection Area (SPA) as designated under the European Union Directive on the Conservation of Wild Birds was an issue raised. In particular, how this directive impacted upon the ability to find suitable receptor/release sites and created concerns that in the long term this might lead to high densities of harriers in relatively small geographical areas. A NE staff member described how disappointed they felt with the grouse moors at the start of the trial as they had had difficulty finding receptor sites. However, they also noted how through involvement in the trial they understood the concerns that the SPA requirement created for those involved,

"They had a clear role to go out and find the sites, the release sites and everything. That was, you know, and that the difficulty they had doing that I think was a bit disappointing, frankly. I think it was because initially they kind of struggled, and we pushed them to pre identify sites for like for the licensing purpose. And this year, they've managed to pre identify all the sites and effectively get themselves into a much better footing early on. So, they've obviously you know, people are prepared to "I'll put a site up, if you need it, you can have this site", you know, within this, because they have to have a release site. If a bird comes from within SPA it must be put back within the same SPA. So, they've had geographically you can't just have one big centre in the middle of the North uplands. So, they've had to identify a number of sites and this year, they were able to do that up front. You know, but one year, they were scrambling around the last minute for one site, you know, and we couldn't, we couldn't move until we got confirmed sites. So, we had chicks in a nest, they wanted to brood manage. And they were running around checking potential release sites just before that, which was a crazy situation" (NE01).

A keeper also discussed how not being sure where hen harrier nest density might occur in advance to enable brood management to be used meant that those that volunteered to act as receptor sites were often unable to because they were not in the same SPA. He suggested that since, in his view, the long-term goal should be for harriers to be found all over the uplands, this seemed unnecessary. He explained,

"It seems a bit farcical to me and in the first years we had a real drama finding the receptor site, for all the Moorland Association has pushed for these members to

come forward and the ones that come forward initially there were in different SPAs and while we did resolve getting the receptor site it was looking touch and go for a while and it just seems ludicrous to me that we cannot move them anywhere in the country prepared to have them” (UL04).

The problems created for brood management in the long-term through the issue of SPAs and receptor sites were also discussed by an estate director who explained that,

“The insistence through the Natural England licensing process and all the rest of it, that we have to have release sites on the same SPA, where these birds might have been taken from, as it were, seems to me not, I mean harriers will go miles and miles and miles. Is it necessary that we have release sites if they are not staying, what's the point of having to have the restrictions on that in the first place” (UL01).

4.3 Issues that require attention in terms of effective ways of working to deliver brood management (n=8).

This subtheme examines additional issues that interviewees raised about the processes involved in brood management that they felt needed to be acknowledged when decisions were being made about its future. These issues predominately focused on Natural England and included issues about ways of working and the resources required to deliver brood management and build from some of the issues described in 3.2. and 3.3. There was also discussion about the potential for mixing broods of harriers raised in captivity so that those of a similar development stage and size can be released together regardless of whether they came from the same nest originally.

A NE member of staff discussed how brood management, and the time demands it places on staff would need to be factored into any decision on the future of brood management. They summarized the future sustainability of brood management in the following way,

“So long term, will it work? Yeah. Is it a long-term solution? Probably. Yes. I believe it is. Is it sustainable long term with the resources we presently have? Definitely not” (NE07).

Ideas about streamlining the process involved in brood management were linked by participants from grouse moors to discussions about how NE could better enable them to undertake other practices around moorland management that can also support harrier conservation. A keeper explained,

“It's just Natural England helping us after the five-year trial, helping, not making it too difficult to keep brood managing. NE don't make it easy to do what we do. I know they're under a lot of pressure from external organisations and like that are anti brood management. But surely, we can see there's been a massive increase in numbers. And it's all going the right way. And so, it's just Natural England making it

a lot easier to be able to roll these licenses out, but they just seem to make life very, very difficult” (UL11).

Three participants also expressed concern about the differential rates at which brood managed harrier chicks grew. Release dates had to be delayed to allow the smallest chick in a brood to develop. It was suggested that this was a problem that could be addressed through the mixing of different broods based on size and readiness for release back into the wild. This involved listening to those with different expertise, now that participants had gained experience of what happens during the trial and what might be best for the harriers. For example, a trial participant explained how,

“I would like to see there be more allowance for the people with the expertise to use their expertise and do stuff. So, for example, I keep telling them if we could mix the clutches so that we put all the older birds together and all the younger birds together and we can get the older birds out, both to the release aviaries and to the wild, quicker, because at the moment, we are hamstrung to the youngest smallest bird. And in the wild, because that doesn't happen because the youngest, smallest bird probably doesn't survive. But brood management means bloody nearly everything will survive that, and I had told everybody right from the word go” (UL12).

4.4 The need for a communication and engagement strategy (n=7)

This subtheme captures discussions about the need for better and clearer communication around the brood management trial both internally within organisations such as NE and the Moorland Association as well as externally to the public and those communities in the uplands who had not yet engaged in brood management. It also reflects participants' desire to see more positive stories about the work being done whilst being aware of the politically contentious nature of the trial. This subtheme has particular relevance to the 'indirect route' component of the theory of change (p.10), where awareness of the trial and constructive dialogue between those who have participated and those who have not is hypothesised to lead towards greater trust and confidence in the ability of the brood management system to manage conflict around harriers.

Natural England staff spoke about the impact that negative stories and communications about brood management had on their work and how they felt the organisation could more effectively recognize the successes of the trial as well as calling out continued crimes involving hen harriers. For example,

“I think that Natural England could support us more and the way to do that is to be a bit, don't be worried about what people say just do it, just and when you get something when you have got some good news put out there. Don't just say nothing and let other people believe other things or be told other things without you saying anything. This goes for harrier crime as well” (NE03).

Another NE staff member explained how a more open approach to communication might help better influence or educate more people about brood management,

“If there is a link between brood management and increasing hen harriers, we ought to be able to say, look, we know you're skeptical about the brood management scheme, there are things we don't like about it as well. But we've had to suck it up and actually, if you're interested in there being more hen harriers, and there are more hen harriers, then maybe that's got something to do with brood management scheme” (NE05).

Reflecting this, participants from the grouse moor community also expressed surprise that a lot of people that they spoke to from NE, beyond those involved in the trial, knew little about it nor how harrier numbers were currently increasing. For example, a participant working on the trial noted that,

“I think that I was surprised how few Natural England officers and so on actually knew how much things had recovered over the last sort of 2,3,4 years. And the progress that is being made. So, if Natural England really aren't taking on board just what is happening it's not surprising the others involved you know, other ENGOS or whatever don't either” (UL01).

A grouse moor keeper also discussed how it was very difficult for anyone to find out any positive information about the trial publicly and that most stories that could be found were negative. This has implications for the indirect route for attitude and behaviour change identified in the theory of change. For example, the keeper stated,

“I mean, it's interesting, I think, because you try it, you try and Google brood management, and you can't get past the opposition to shooting, you can't get past the brood meddling” (UL05).

Part 4. Impact Evaluation Findings

Theme 5: The meanings/mechanisms of success and the outcomes of the trial

Step 6 in the Hen Harrier Brood Management Trial Monitoring and Evaluation Plan (2016) refers to testing the hypothesis that, as a result of the availability and practice of brood management, grouse moor owners and managers become more tolerant of hen harriers on their land. Attitudinal/behavioural change among persons involved in grouse moor management is therefore a central component of 'success' for the brood management trial as changing attitudes and behaviours among those owning or working on grouse moors is seen as a crucial mechanism by which hen harrier persecution will be reduced. One of the key evaluation questions for this project was to explore perceptions of attitude and behaviour change thus far (and the dynamics between them) amongst those who have participated directly in the trial. This also includes what success means or looks like for different participants and what participants perceive to be some of the key outcomes of the trial so far.

The research provides evidence of attitude and behaviour change toward hen harriers on grouse moors by those who have participated in the trial. Those participating in the trial clearly recognise the need for coexistence and an end to illegal persecution. They also suggest that especially within the last five years there has been a wider change in attitude toward harries among the grouse shooting community due to recognition that the future of grouse shooting is intrinsically linked with the future of hen harriers. Brood management was perceived to have tapped into this change and helped harness it in a practical way. However, participants also identify that attitudinal and behavioural change takes time, behaviours might be changing quicker in some places and with some people than with others, while similarly attitudinal change towards harriers' varies among grouse moors. The championing of those that have participated in the trial and demonstrated that it works was seen as an important mechanism for influencing wider change among those who have not yet been involved in brood management. The ecological success of the trial and the wider increase in the hen harrier population during the trial period was also suggested as demonstrating wider attitude and behaviour change as well as providing evidence that brood management does not negatively impact upon hen harriers themselves. Finally, those that participated in the trial indicated that they would do so again and that they hoped that brood management would continue to be available to grouse moors beyond the trial period.

5.1 Attitude/ behaviour change (n=14).

There is evidence that brood management is contributing to attitudinal and behavioural change among those that have participated in the trial. More generally, participants

suggested that, especially within the last five years, there has been a general attitude change within the grouse shooting industry towards increasing tolerance of harriers and the role that grouse moors can play in their conservation. They believe that brood management has tapped into and been able to harness this. There was also recognition that there are still some who haven't changed. As a moor owner described,

"Grouse moor owners, the majority, I think, not everyone, and many, many keepers realise that the writing is on the wall. And if we don't do something about it, then we might lose grouse shooting, or we might be licensed. So, either you do something about it, or you blithely go on until it's stopped. Just in the last five years actually, attitudes have changed and will continue to change. But I think we're still a little bit away from what I would say is complete acceptance by every grouse moor owner and every grouse moor manager and every grouse moor keeper. We're still a bit away from that. But it's getting stronger as each year passes" (UL06).

Others similarly discussed what they saw as a wider shift in attitudes towards harriers, as well as recognition that while such change isn't universal, brood management is playing an important role in facilitating change. For example, another moor owner explained how,

"It [attitude change] is gaining momentum all the time. You know, if you think you don't have to go back all that far in history to the point where, you know, game keepers, whilst it was legal and so on, took out anything that predated on grouse. That's the way it was. That's long consigned to the bin, hopefully, but the way that grouse management was, I think that the modern generation, if you like, of keepers, know perfectly well, that that is totally unacceptable. And we've adopted very much a zero tolerance to persecution or doing anything that is illegal. It starts from the shooting community. Okay, we all know that there's going to be the odd bad egg in there but having said that, I still think that as far as harriers go, the trial has been a very important part in the changing" (UL01).

Brood management was discussed as something which has been able to harness and solidify the wider change in attitudes, as a NE staff member identified,

"The big thing for me is the fact that the estates have bought into this. So, this is always, from my perspective, about hearts and minds. And, you know, it's all about people actually and the estates and the gamekeepers are buying into this, and it's acted as a talisman around which they've changed their behaviour. It's one of the things that has really, you know, they've said they, you know, they know, they have to change their ways, they're gonna have to live with hen harriers, the world has moved on. And, you know, this, this has been a mechanism to allow them to start making that change going forward" (NE01).

It was noted that changes in attitude and behaviour will take time, but any change will be beneficial, and that brood management is assisting in this change. As another moor owner described,

“When you've been used to doing a job for years and years, to about turn or to take all this on board is it's going to take quite a while. To suddenly think, what you might have always envisaged was something doing you a lot of harm is actually now part of your success story, that you need to take some enjoyment from. But I can see that happening” (UL02).

The wider context for change was also discussed by keepers who noted how their experience of brood management has impacted on their own attitude and behaviour as well as how they think that a change in moorland owners' attitudes will help cement change over time. For example, discussing his experience as a keeper on a moor that acted as a receptor site an interviewee described how,

“When the birds actually came, me and another keeper xx we went on a training course so we could help feed them, we did the night feed of the harriers in the evening. And on an evening or late afternoon, we went up every day and fed them. So, we saw them every day from coming to leaving. I mean, if someone had asked me 10 years ago, if you'd be feeding them, I would have never believed them. But I mean, I think a lot of it is the owners, if the owners can, you know, say that the keeper's jobs are secure that's the start. And, you know, I think that, you know, most moors now have accepted that the future of them will involve hen harriers and, I think the change over the last sort of five years, the change in attitude has really been obvious. There will still be some that aren't, and I think the future of it might not suit some owners and it might not suit some keepers but as we go on, they will probably not do it or sell the moors or lease the moor and then the people that are looking at it will probably take it on board, so I think it will take a few years to go through. But I think we will get there” (UL05).

Natural England staff were also able to provide examples of where they had experienced a change of behaviour from keepers and owners during the trial, for example,

“One of the key phrases and think it is a turning point, an old sage keeper who I've known for 15 years, took me to one side and said xx, years ago we couldn't live with hen harriers now we can't hope to live without them. And I thought that is brilliant” (NE07).

Additional examples of change in behavior among owners and keepers were discussed by others that had participated in different roles in the trial. It was suggested that increases in harrier numbers in the last few years beyond those that were brood managed was evidence of reduced persecution and therefore behavior change. However, it was noted that changing attitudes might take more time. For example, an interviewee working with grouse moors described how from their perspective,

“I think the shooting fraternity in general is very, very much more aware that they are in the limelight, and if they don't start to behave themselves, both with thinking about not using lead, and not shooting every predator known to man. And of

course, grouse shooting being a much smaller, although very valuable type of shooting is, is going to be more at risk. And they are very aware of that. Yeah. And I think the keepers are too. In fact, I know the keepers are too, I think they are being sensible. I mean, the numbers of hen harriers that we've got up there this year, and the breeding is way over what the brood management has been involved in. So, I think their behavior is changing. But their attitude hasn't quite got there yet. But I think the attitude is changing as well and although they don't necessarily love hen harriers, they're beginning to gain a greater understanding on them" (UL12).

5.2 Mechanisms of change (n=6)

This subtheme relates to the ways in which interviewees discussed how participation in the brood management trial was helping to influence attitudes and behaviour amongst the wider grouse shooting community through the sharing of experience and the championing of those that had participated. It also identifies how some of the processes involved in brood management, such as the tagging and monitoring of brood managed birds may also be leading to change. This subtheme has relevance to the indirect route of the theory of change as it speaks to the hypothesis that those not directly participating in the trial may change their attitude and behaviour towards harriers on their moors through exposure to the experiences of those that have.

A participant working with grouse moors for the trial explained how they are trying to influence the wider grouse shooting community about the benefits of brood management as a means of supporting grouse shooting and reducing persecution of harriers,

"What we have been trying to do is to turn the tables to make this successful, successful keepers, successful moors or whatever in achieving whatever to make sure that those keepers are seen as heroes. And I think that is now happening. And hopefully that is then creating, if you like its own peer pressure. So, you are then getting neighbouring moors saying, oh, well, blimey, they've done it, and that was successful. And it's worked well, and so on" (UL01).

Sharing and promoting the benefits of brood management or at least trying to reduce anxieties associated about potentially participating (see theme 1.3) through the sharing of personal experiences was also another attitude and behaviour change mechanism identified. As a keeper explained,

"I had keepers ringing up who are acting as receptor sites, and I sort of reassured them from my experiences. And so yeah, it just seems to be part of the norm now. People are open to it" (UL11).

From the perspective of those directly involved in the trial, brood management enabled moors to hold each other to account for any persecution through greater self-policing. For example, a NE staff member commented that,

“While I think we can't prove it [change] at the moment, there is tenuous correlations. But to me, it's stark. Since we put brood management on the table, overwinter survivability has gone through the roof. So, it's like as if now the safety net they've been wishing for many years is in place. And I, you know, they've been having these conversations, and they've been having these, you know, discussions whereby they're almost policing themselves. They're almost now thinking, you know, in a way, years ago for them, hen harriers were a global problem. Now, they can be a global problem if one of them is shot in their area” (NE07).

Finally, in terms of mechanisms of change it was noted by a NE staff member how the tags put on birds that are brood managed, and the greater data that this provides, which is key to changes in attitude and behaviour. This is because the data helps alert staff to any persecution, and this awareness potentially increases self-policing within shooting communities,

“What's good about it, is the fact that these tagged birds are like sleeping policemen, basically they alert us to persecution, it's as simple as that. We can follow the birds around and they help us more to understand better the interaction between the gamekeepers and the birds” (NE04).

5.3 Ecological success of the trial (n=11).

Analysis of participant interviews identified that the ecological outcome of increased hen harrier numbers during the period within which the brood management trial was taking place was seen as an indicator of the success of the trial. This success was further supported not only by the increase in harrier numbers overall, but also by the view that participants felt it had been demonstrated that brood managed birds can thrive and integrate into the wild just as well as non-brood managed harriers. As an NE staff member explained,

“We can now state categorically that it works. So, there's lots of things that went well, but I think that they all pale into insignificance next to the fact that we now know it ecologically works. And of the eight brood managed birds that were released most of them made it into the breeding season, which is incredible, survive over winter survival first and foremost. And of those, five of them bred, two of them actually found each other and bred together, which is absolutely incredible. But they bred with other wild birds, they acted completely normally” (NE07).

It was suggested by some interviewees that worked on or for grouse moors that brood management has helped to increase harrier numbers by giving chicks a better start in life thereby increasing survivability. For example, a moor owner described their view on this head starting idea,

“The results, if you like we had 4 last year, 4 this year, have been extremely successful and those harriers have had a very good start in life. Some of them that

were brood managed last year have bred this year, which I don't think happens too often in the wild, wild situation if you know what I mean. Because brood management has given them an exceptionally good start in life. They've been living in a five-star hotel with food and whatever from the word go when they were first recovered from their nest site, wherever it may be, yeah, yeah. So, in terms of brood management, being a success for live fledged harriers. I think it is it has been extremely successful. And if you take the nests that have been brood managed, versus four or five eggs in the wild. How many of those would have produced fully fledged harriers" (UL01).

A gamekeeper suggested that the ecological success of the brood management trial demonstrates that grouse moors can help conserve harriers,

"From the start of the trial, the trends just gone through the roof with harrier numbers from what they were, and the fact that yeah, the bulk of those are on managed moors and the fact that you've got brood managed birds going back and breeding has to be a success" (UL11).

5.4 Support for the continuation of brood management (n=9)

This subtheme of success/outcomes of the trial relates to participants attitudes to ongoing participation and support for brood management and whether having been part of the trial they believe it should or should not become a permanent tool to assist with grouse moor management and hen harrier conservation. A keeper discussed how,

"I would probably do it again. Knowing what I've learned from the first experience" (UL11).

Another keeper explained their support for the availability and use of brood management on an ongoing basis by reference to their perception that there are limited alternative options for managing harrier conflict which enable both harriers and grouse moors to positively benefit. For them therefore, stopping it would be problematic,

"I think it is a vital tool that moorland owners and keepers will be keen to keep. It gives us confidence that we can do something about numbers you know. How else could we do it? I think people would be concerned if the brood management thing isn't there as an option. I think people would wonder where it was all going to end up" (UL04).

Awareness that attitudinal and behavioral change takes time, but that brood management may be helping this process while also delivering short term outcomes, was given as a reason for keeping brood management beyond the life of the trial. A moor owner explained that not making it available longer term would have a detrimental impact on moors,

“Well, if it’s not carried on for another five years, it will be criminal. That will have to be a political decision rather than a sensible one. Because what happened, if you look at the numbers over the last few years, and you think, why would we not keep this going for another five years, at least? And just see what happens next. You’re already changing attitudes. It’s happening, it’s already happening. Five years is nothing in terms of grouse moor management. You know, people have been doing this for generations since the mid-1800s. That’s when driven grouse shooting first started. You’ve got to give it time, you’ve got to give them proper time” (UL06).

Perceptions about the possible detrimental impact that not continuing with brood management beyond the life of the trial would have were echoed by NE staff. For example,

“I think to stop it now, suddenly, to pull it away, would be a retrograde step in terms of that movement. You know, I think we need to show continued support for the direction of travel that I believe they are heading in” (NE01).

Part 5. Additional considerations for evaluation

Theme 6: Additional considerations for brood management and hen harrier conflict reduction

This theme refers to perceptions about the wider pressures grouse moors face and the role such pressures play in the acceptance, support and use of brood management. The theme illustrates that when discussing the future of brood management, it is important to recognise that it is not taking place in a vacuum. There are other issues impacting upon behaviours, attitudes and relationships on the uplands that could help or hinder engagement with brood management.

Analysis identifies that keepers and moor owners perceive that they face a number of other pressures which impact on the sustainability of grouse shooting and grouse moor management that are not alleviated by brood management. Issues about licensing to control other predators as well as about heather burning are creating a context in which they feel under siege. Despite this, there is agreement that the trial is holding up well and is a bright spot within these wider issues. While perceived pressure created by several different types of predators were discussed, it was that posed by gull species that appears to be creating the greatest concern and frustration for keepers and moor owners. Participants wanted greater support with this issue. It was discussed how this support could be explicitly focused on those moors that were demonstrating their commitment to hen harrier conservation through brood management and diversionary feeding. Questions

were also raised by a small number of participants about whether brood managed harriers were artificially inflating harrier numbers more generally and whether this was ok or not. This was linked to concerns about whether keepers are not persecuting harries because they cannot differentiate between brood managed and non-managed harriers rather than because there is a change in attitude and behaviour more generally. Finally, discussion revolved around what the future of grouse shooting, and hen harriers might look like in terms of sustainable and acceptable numbers of both and how this may shape the future of grouse shooting.

6.1 Wider pressures on grouse moors (n=10).

In the uplands, grouse moors are facing pressures in relation to a range of other issues that impact on the attitude and behaviour of owners and keepers. It is important to have awareness of these issues and the cumulative impact they have on relationships and behaviour on grouse moors when considering brood management and hen harrier conservation more broadly. A Natural England staff member explained this wider context,

“The trial is not going on in a vacuum. It's going on in the background and all the other stuff that's going on. As I said, at the same time as a hen harriers' trial been going on. We've changed our approach to licensing controls for gulls for example. In terms of grouse that's probably having a bigger effect and is certainly driving them mad and we're pushing on stopping burning on blanket bog that's kind of in their minds that's going to have a bigger effect as well. All of these things are cumulative. So, they are feeling under massive pressure. So, as I say the harrier thing is just a part of it that is going on against the background of all this” (NE05).

An interviewee who works with grouse moors and had helped with the brood management trial discussed how it is important to situate brood management within the range of wider issues that are impacting upon relationships and therefore the attitude and behaviours of people living and working there. Their view was that the trial was an exception to the general problems and issues faced,

“I felt it was important to put the trial in with everything else if you like, that is going on because it affects the overall attitude. So, I think you know, actually, the trial has stood up remarkably well given the other difficulties that these moor owners, the keepers and so on face, the fact that it is their home, their livelihood, their everything else, which is being I was going to say, so badly affected, but it is badly affected, I'm afraid” (UL01).

Expanding on the suggestion that brood management has worked well despite everything else going on, a gamekeeper discussed how they face a range of pressures from other predators that predate on and reduce grouse numbers that they feel they are unable to do anything about. In this context, any tool, such as brood management that can in some way help to alleviate these impacts and thus the pressure on keepers is seen as a good thing,

“We need that tool because we're under so much pressure from other raptors. I mean, red kite numbers, buzzard numbers, sparrow hawk numbers, raven numbers, badger numbers have gone through the roof nationally. So anywhere we can sort of create that balance. It's got to be a good thing” (UL11).

Taking this issue of the pressure from a wide range of predators further, one of the biggest issues raised by participants was the perception that issues associated with licensing processes for the management of predators create problems. As an interviewee working with the Moorland Association explained,

“The hen harrier, I think, the trial, the brood management interventions, etc. They all run despite whatever else is happening. What I can tell you is there seems to be a monumental muddle over what should be controlled where and why. And there seems to be some very strange conclusions being arrived at and slightly odd readings of the law and purposes and requirements” (UL03).

6.2 Predator control and licensing on grouse moors (n=9)

This subtheme explores frustration from those working on grouse moors at the perceived lack of ability to obtain licenses to help manage other predators. While brood management appears to have been well received by those who have participated in the trial, the perception remains that the inability to obtain licenses to control other predators that predate on grouse creates pressures that are not fully mitigated by the ‘safety valve’ of brood management. For example, an individual working on the trial in the uplands explained how,

“You've got, if you like, the plus of the tool of the brood management scheme on the harrier front, you've got a massive, massive minus in terms of the ability to get from Natural England a license to control some of the other predators and particularly gulls. So that's effectively been taken away. And you know, in terms of, in terms of if you like, the predation, you've got it spiralling upwards, predation wise because of what's happened over the issue of licenses, not getting licenses to control gulls and, and other things. You know, so that's where I'm talking about this one-way traffic” (UL01).

Problems perceived associated with wider licensing issues create a context within which grouse moors believe that they are not listened to and feel under pressure to change what they do and how they do it. An individual working with the grouse shooting industry explained how people talk each other and share experiences and how this creates a shared sense of victimization that impacts on the willingness of people to engage with NE on conservation issues. Despite this, brood management was still differentiated from other experiences in this wider context,

“Remember, you know, we're an industry that talk to neighboring keepers, neighboring estates, neighboring you know, we do, and we you know, regularly

discuss things and there are still things there are still huge issues, but it's not from the hen harrier trial. You know, the massive distrust of Natural England right now due to this, you know, the farce with the licenses, the bird licensing, corvid licenses, gull licenses, even the stoat traps and things like that, you know, we feel like the industry we've just been basically killed off with legislative, small legislative changes which might seem small to Natural England, but to make huge difference to us" (UL09).

Keepers were explicit about the problem of trying to obtain licenses to control other predators that negatively impact on grouse moors, both in terms of grouse numbers but also other ground nesting birds. They suggested that the evidential requirements needed to obtain a license to control other predators is very difficult and they want greater support to help them do this. For example,

"They [NE] have got to look at populations. And not just one population, I mean, the gull population, we apply for a license every year. And that's slowly got reduced and reduced and reduced with no consultation to the estate, just did it off their own back. And then now we've got a total ban from gulls. And it's like, we've looked into applying for the license and it's absolutely, you're not going to get it, conservation is about three quarters of the way down the list of who will get gull licenses. So, you get aviation, public health and things like that all comes first. But we need to see evidence that, of why they made those decisions, where's your evidence of the population in decline? Maybe the coastal populations are in decline, but then the inland population, we've seen a massive increase. We've got video evidence, attacking lambs and chicks and everything else. But to actually prove on a moor or give evidence of gulls actually picking chicks up and flying away you'd need like David Attenborough and his full team sat out to get the evidence. The whole fiasco with the crow licenses is absolutely ridiculous. They need to start making it easier for us to do what we do. We are all happy with, with doing more paperwork and few more restrictions but to take control away of certain species without any science base behind it, without any interaction with the estates who have been doing it is ridiculous. It's so frustrating" (UL11).

Another keeper explained how the cumulative impact of a range of predators on limited prey created both imbalance in predator/prey relationships on grouse moors but also greater pressure on keepers to try and maintain grouse numbers for shooting. Consideration of this they suggest would help create a context where grouse moors feel more confidence in supporting harrier recovery,

"This is not a suggestion, but I suppose it is. Like we said before, it's mouths, isn't it? And if there was potential, I mean, for example, the, you know, the hen harriers, we've got the problems with the general licenses that cause problems with crows, and then we've got the gulls. You know the license. We actually, we were lucky enough to get a license for gulls last year, but there are problems around, there's quite a lot of mouths to feed, with all the things that are protected. And that's, you

know, that, that long term effect, if they could, I'm not saying be reduced, but if that could be studied and looked at and the problems caused understood. I think, you know, if, if you've got harriers, but you are already saturated with things like crows, gulls, ravens and other protected species like buzzards and things that potentially mean that your losses are too great. Whereas if it was a balance between everything that, you know, hen harriers aren't the only species that eats the grouse, obviously, and that is, you know, so that's one thing, but if you have harriers and everything else, it's the waders and the things that they can be predated" (UL05).

6.3 Brood managed and non-brood managed harriers and future population questions (n=4).

This theme considers questions pertinent to data collected as part of Natural England's monitoring work on hen harriers. While only raised by a few of the interviewees the relationship between brood managed birds and their population success compared to non-BM birds is worthy of note. This is because it has relevance to the analysis of attitude and behaviour change as it addresses the issue of continued harrier persecution and how widespread it might be. It also has relevance to the cost consideration issue raised in 5.1. around satellite tagging of brood managed harriers. An NE staff member raised a question about the acceptability of the trial if results over time suggest the population of harriers increases but is driven by brood managed birds compared to non-brood managed harriers. They noted,

"What If in the end if all we've got is tagged brood managed birds, but we are getting 30-40 nests, then we've got harriers back. And that started to work now, it's started to happen" (NE03).

Another NE staff member described the process through which this could occur. They discussed whether a harrier's involvement in brood management and subsequent satellite tagging offers it greater security from persecution than those which have not been brood managed and satellite tagged,

"When you get the situation where you get a tagged bird it's like, sometimes you can see the birds, obviously carrying a transmitter, but a lot of them you can't, so hypothetically if they take a shot at a bird and that bird is transmitting at that particular time well, you've more or less got them banged to rights because you can tell the transmission gets cut short. You cannot initially tell whether the bird is dead or not. Because if it's got rid of it straight away, obviously damage the tag etc. You know, you've got no chance, other than you know it last known fix. So, my question is are they very wary at the moment of killing harriers indiscriminately, so they want to know where the tagged birds are. And if I have a tagged bird, the other harriers around it will stay stable but if they think they can identify a bird that's not one of ours or a brood managed bird they might do it. But now, with all the tagged

birds they know something has got to change, got to give. So, there are good bits and bad bits, but we are making progress here” (NE04).

The issue was also discussed by someone working on the trial external to NE who explained how long term it is an important issue to review,

‘Now there is one thing that slightly concerns me and that is the first year we lost all the chicks, once they had fledged and I think there is a 50/50 chance that some of them were shot. We didn't lose any in the second year. And I don't think I could be wrong, and you need to check this. I don't think the keepers were given satellite information in the first year. From then on, all the keepers who were involved were given satellite information as to where the birds were which they probably share. Which means that any intelligent keeper would have said okay, don't shoot any of those. So that slightly concerned me because it's sort of skews the file a little bit. I think it's interesting to me and I may be the only one who would actually voice it. But it does concern me a little’ (UL12).

6.4 Questions about longer term ‘balance’ and sustainability in the uplands (n=11)

This subtheme examines questions raised by participants about what the future might be in terms of social and ecological balance in the uplands. For example, how many hen harriers are enough? How many predators are enough and what do sustainable levels of grouse for driven shooting look like in the future? In discussing the future of brood management an NE staff member raised questions about its limits going forward and how it should act as a bridge between current conservation concerns about harriers and a sustainable future with a viable hen harrier population,

“What I don't foresee, and I don't think anyone really sees is ever moving into some sort of hen harrier factory situation. You know, I could, if this kept running for a few years, I could see a situation where they were potentially brood managing four or five broods a year. But above that, it becomes an industry that nobody wants. So, I see it as, as an midpoint measure, that there's a tool in the box that helps the grouse world move to a more sustainable future” (NE01).

Another NE staff member discussed how as harrier numbers hopefully continue to increase there will need to be greater flexibility in how, where and when brood management can be used and such considerations should form the basis of ongoing and continuous dialogue between the different parties involved in hen harrier conservation on the uplands,

“I think as well, you need to look at when is enough enough? If it does take off, you know, if there's a point where, you know, I mean, I don't know, 300 pairs doesn't sound unreasonable to me. But if the 300 pairs are on one or two moors, it's a different, it's a different thing. Yeah. And I think, you know, the 10 kilometre I mean,

I don't think anything should be set in stone. That's the thing. It needs to be flexible, and you need to talk to people because the whole thing is moving on, isn't it?" (NE06).

A keeper also raised questions about what a viable and sustainable number of harriers might be in the future and concerns about the impact high numbers of harriers could have on grouse moors if such populations are not more widely distributed across suitable habitats,

"I mean, I suppose if we get more and more hen harriers surviving whether they are in the wild or through brood management so your numbers will obviously increase because, I mean, they increased a lot this year. Logically, by next year, they could double. I mean, you could ask the question, how many Harriers does anybody want? Do you want 1000, 100,000. So, you could get a massive number of predators, concentrated in fairly small areas, that would have a big impact on all the other things that live there. So, you know, you could ask the question, how many do people want? Because if numbers increase to a very high density, if it becomes unviable for grouse moors to exist, then that management ceases you then have no predator control, no habitat management, your numbers of your other predators increase, your harrier numbers also decrease so it's about balance" (UL07).

Another keeper also raised questions about what sustainable and suitable numbers of grouse might be in the future and the need for discussions from within the shooting industry about balance on moorlands,

"I asked the question earlier of how many hen harriers do people want to see? Well, the other question would be, how many grouse do people want to shoot? There are some moors that I said, years ago, that were trying to shoot bigger and bigger bags. You know, because I've always been interested in the birds. And I don't really shoot that often. Over the years I've been invited on, I've been a groundskeeper for all those years I think I have only shot eight grouse and it didn't feel that right to me, because I'm interested in the birds. But you know, there are people that can be greedy, and want to shoot more and more and more, and they're not satisfied' (UL11).

A grouse moor owner explicitly raised the issue about the future of grouse shooting and what is both financially viable as well as ecologically desirable. They discussed how there may need to be a concerted effort from within the industry in terms of how they advertise and sell grouse shooting to interested parties that focuses as much on the experience of being on the moors for the day as it does on the number of grouse people should expect to shoot. By doing so they suggest that you can support harriers as well as other species that benefit from the management and habitat that grouse moor management creates while still providing the finances required to do so,

“You've got this challenge of you have to shoot a certain amount in order to justify it, in order to create some income. Otherwise, it's not sustainable, you don't generate enough. There's a market, you have to meet the market needs and will the market change in the future? I hope it does. At the moment what happens is you sell a day's grouse shooting on the amount of grouse you shoot. So, we'll lease a day or sell a day for 100 brace and the price maybe 170 quid a brace so there you go 17 grand for the day. Now it would be great to get away from that and say we'll sell you a day's grouse shooting. Full stop. Come and go shooting, we don't know what you're going get. We're not going to tell you, just go for a day's shooting. You could end up with this amount, you could end up with that amount. But the trouble is you have to be able to shoot something. Because otherwise it's not grouse shooting. If they shoot one grouse and you've got nine guns and one person shoots one, they're going to be unhappy customers, so they'll go somewhere else. Is 50 brace enough? Or 100 brace you know, there's a number there somewhere where people go: 'That's not just as a lovely day out, it's some great scenery, some fantastic people, been out on the moors, had a lovely lunch and I've shot a few grouse, enough to make me feel as if I've been shooting grouse.' Not I've slaughtered thousands of the things. But I've shot enough to make me feel as if I've had a lovely day out. And there's something about it. It's incumbent on moorland managers to change the attitude about selling a day's grouse shooting, not selling a bag of grouse” (UL06).

Conclusions

This report sought to answer the following specific evaluation questions:

1. To what extent has the project produced the anticipated outcomes among moorland owners and gamekeepers participating in the trial? Specifically,
 - a. Changes in moor owners' attitudes/behaviours towards hen harriers on grouse moors?
 - b. Changes to keepers' attitudes/behaviours toward hen harriers on grouse moors?
2. What are the main mechanisms by which outcomes have been produced?
3. Is there any variation in outcomes in different contexts?
4. How effectively has the trial been delivered? What, if any, changes are required for the future of brood management?

In relation to question 1, changes in moor owner and keepers' attitude and behaviour, the research provides evidence of positive attitude and behaviour change toward hen harriers by those who have participated in the trial. Those participating in the trial clearly recognise the need for coexistence and an end to illegal persecution, although this appears to be linked to both conservation of harriers as well as conservation of grouse shooting. They are actively working to help conserve hen harriers as part of the trial and provide space for harriers on their moors. They are also trying to promote brood management to the wider grouse shooting community.

Moor owners and keepers also suggest that within the last five years there has been a wider change in attitude toward hen harriers among the grouse shooting community due to recognition that the future of grouse shooting is intrinsically linked with the future of hen harriers. Brood management is perceived to have tapped into this change and helped grouse moor owners harness it in a practical way. However, participants also identify that change takes time, behaviours might be changing quicker in some places and with some people than with others, while attitudinal change towards harriers varies between grouse moors.

The ecological success of the trial in terms of the wider increase in the hen harrier population during the trial period was raised by participants as indicating attitude and behaviour change beyond those that have directly participated. Finally, those that participated in the trial indicated that they would do so again and that they hoped that brood management would continue to be available to grouse moors beyond the trial period.

In relation to question 2, the main mechanisms by which outcomes have been produced, the report identifies that the Theory of Change developed to hypothesise the route through which attitudinal and behavioural change may occur is valid, at least in terms of the direct route (those that directly participate in brood management). Grouse moor owners and keepers acknowledge a fear that large numbers of hen harriers can threaten the economic

viability of a grouse moor through the impact of their predation on grouse. This fear is (in part) driven by reference to the Langholm moor demonstration project where a similar process was perceived to have unfolded.

Within this context a lack of clarity and certainty about the future of brood management is a potential barrier for wider engagement with it. Grouse moor owners and keepers do not want to be left in a situation in which they have helped to create colonies of hen harriers on grouse moors which threaten their viability without a legal remedy.

Brood management is a tool that is perceived to offer a suitable legal remedy to this situation. There is evidence that brood management acts as a tool to relieve pressure on grouse moors where there is a high density of hen harriers on moorland, allaying owners/managers' concerns about hen harriers overrunning the moors. Furthermore, the championing of those that have participated in the trial and have demonstrated that it works was seen as an important mechanism for influencing wider change among those who have not yet been involved in brood management.

In relation to question 3, variation in outcomes in different contexts, the report identifies that the wider context of conflict within which brood management has developed has an impact on engagement with it. A perception exists among those interviewed who work on or for grouse moors that hen harriers have become symbolic of the polarisation between those that want to ban shooting and those that don't. Because of this polarisation there is a perception that the positive role that grouse moors may play in conservation in the uplands, including through brood management, is ignored. These two factors have created apprehension among those working on or for grouse moors about participating in the trial, particularly in terms of the possible negative attention participation might create from those opposed to shooting.

Analysis identifies that keepers and moor owners perceive that they face a number of other pressures which impact on the sustainability of grouse shooting and grouse moor management that are not alleviated by brood management. Issues concerning heather burning and licensing to control other predators are creating a context in which they feel under siege and may impact on engagement with brood management.

While pressure created by several different types of predators were discussed, it was that posed by gulls that is creating the greatest concern and frustration for keepers and moor owners. Greater support and help with this issue were wanted. It was discussed whether this could be explicitly focused on those moors that were demonstrating their commitment to hen harrier conservation through brood management and diversionary feeding. Finally, the report identifies a desire to explore what would constitute a sustainable population of both grouse and harrier and how this may shape the future of grouse shooting.

In relation to question 4, how effectively has the trial been delivered and what, if any, changes are required for the future of brood management, participation in the brood management trial has strengthened trust between moor owners and keepers and those

working on the trial from Natural England, particularly those involved in monitoring harriers on the ground.

The report identified that perceptions of trust and legitimacy are vital for successful interpersonal and interorganisational relationships and work in the uplands. However, positive experiences of working on the trial and relationships with NE were explicitly differentiated by those from within the shooting community from their negative experiences of working with NE on other issues in the uplands.

Moor owner and keeper relationships with environmental non-government organisations (ENGOS) and raptor conservation groups were perceived to be relatively unchanged despite participation in the trial while there was a perception that NE's relationship with such groups has worsened due to their involvement in the trial.

Issues associated with the cost of brood management, perceptions of the increasing bureaucracy of the paperwork involved and the scale at which it can be undertaken were all raised by participants as issues requiring further consideration.

Resource requirements for NE to effectively deliver brood management on the ground were also raised as was the need for greater focus on engagement work and building trust in interpersonal relationships on the uplands.

The need for a clearer and improved communication strategy around brood management, its results and related positive stories was raised. It was perceived that most of the information that can be found publicly about the trial is negative and that this may create reticence among moor owners and keepers who have not yet undertaken brood management. The communication strategy may limit the trial's effectiveness in publicising the 'safety valve' effect for grouse moor managers. It may also fail to identify the conservation success of the scheme in improving hen harrier population numbers.

Limitations and future research

It is important to recognise a number of potential limitations of this study. First, although the researchers are not part of the project delivery team, their affiliation with Natural England may have limited respondents' willingness to be open and honest about their experiences of the trial. Second, in order to provide evidence for the process evaluation, the sample is limited only to those who are delivering or participating in the trial. At the time of writing there have only been a limited number of grouse moors where the density threshold for using brood management has been met as well as receptor sites assessed as suitable for harrier release within the same SPA. This has resulted in the comparatively small sample size of this research compared to the total number of grouse moors and people involved in grouse shooting. As such, participants are likely to be among those members of the moorland management community who are most receptive to the idea of brood management and who recognise the need to change attitudes and behaviours.

Caution must therefore be taken in extrapolating the potential effects of rolling the trial out more widely.

This second limitation has implications for validation of the Theory of Change. As noted on page 22 of the report and seen in figure 1 (p.11) the Theory of Change hypothesises both a direct and indirect route to attitude and behaviour change. The direct route specifies that participation in the brood management trial will improve trust and confidence in the 'system' to manage conflict. In turn, this will lead to a reduction in the perceived need to illegally control hen harrier populations among moorland owners and managers. The evidence provided by this report supports that hypothesis. The indirect route hypothesises states that awareness of the trial among the wider shooting community will contribute to changing their attitude and behaviour. This indirect route component of the theory of change and its wider sample of grouse moor stakeholders has only been evidenced indirectly in this report (subtheme 4.4 and 5.2) and is an important gap in the evidence required for overall evaluation of the success of the trial. Behavioural change among this wider sample is difficult to study and may better be evidenced through analysis of hen harrier population data during the trial period. Further data on attitudinal change and behavioural intentions among the wider grouse shooting community could be captured through quantitative questionnaire-based approaches that build upon both the pre-trial research of St. John et al., (2018) and the evidence provided by this report. The NE report NECR615 Brood management social science report addresses both limitations (sample and testing indirect route) and should be read in conjunction with this report.

References

- Astbury, B. and Leeuw, F.L., 2010. Unpacking black boxes: mechanisms and theory building in evaluation. *American journal of evaluation*, 31(3), pp.363-381.
- Braun, V. and Clarke, V., 2019. Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, 11(4), pp.589-597
- Braun, V. and Clarke, V., 2021. To saturate or not to saturate? Questioning data saturation as a useful concept for thematic analysis and sample-size rationales. *Qualitative research in sport, exercise and health*, 13(2), pp.201-216.
- Brooks, J., McCluskey, S., Turley, E. and King, N., 2015. The utility of template analysis in qualitative psychology research. *Qualitative research in psychology*, 12(2), pp.202-222.
- Gabler, C.B., Butler, T.D. and Adams, F.G., 2013. The environmental belief-behaviour gap: Exploring barriers to green consumerism. *Journal of Customer Behaviour*, 12(2-3), pp.159-176.
- Grimmer, M. and Miles, M.P., 2017. With the best of intentions: a large sample test of the intention-behaviour gap in pro-environmental consumer behaviour. *International Journal of Consumer Studies*, 41(1), pp.2-10.
- HM Treasury 2020. *The magenta book: guidance for evaluation*. HM Treasury.
- Kazi, M., 2003. Realist evaluation for practice. *British journal of social work*, 33(6), pp.803-818.
- Malterud, K., Siersma, V.D. and Guassora, A.D., 2016. Sample size in qualitative interview studies: guided by information power. *Qualitative health research*, 26(13), pp.1753-1760.
- Newell, P., Bulkeley, H., Turner, K., Shaw, C., Caney, S. and Shove, E. (2015) Governance traps in climate change politics: re-framing the debate in terms of responsibilities and rights. *WIREs Climate Change*, 6:6, 535-540
<https://doi.org/10.1002/wcc.356>;
- O'Connor, C. and Joffe, H., 2020. Intercoder reliability in qualitative research: debates and practical guidelines. *International Journal of Qualitative Methods*, 19, p.1609406919899220.
- Onwuegbuzie, A.J. and Collins, K.M., 2007. A typology of mixed methods sampling designs in social science research. *Qualitative Report*, 12(2), pp.281-316.
- Pawson, R. and Tilley, N., 1997. *Realistic Evaluation*. London: Sage.
- Reynolds, K.J., Subašić, E. and Tindall, K., 2015. The problem of behaviour change: From social norms to an ingroup focus. *Social and Personality Psychology Compass*, 9(1), pp.45-56.

Roberts, K., Dowell, A. and Nie, J.B., 2019. Attempting rigour and replicability in thematic analysis of qualitative research data; a case study of codebook development. *BMC medical research methodology*, 19(1), pp.1-8.

Robinson, O.C., 2014. Sampling in interview-based qualitative research: A theoretical and practical guide. *Qualitative research in psychology*, 11(1), pp.25-41.

Sheeran, P. and Webb, T.L., 2016. The intention–behavior gap. *Social and personality psychology compass*, 10(9), pp.503-518.

Shove E. and Walker, G. (2007). 'CAUTION! Transitions ahead: politics, practice, and sustainable transition management', *Environment and Planning A*, 39, 763-770, <https://doi.org/10.1068/a39310>

St John, F.A., Steadman, J., Austen, G. and Redpath, S.M., 2019. Value diversity and conservation conflict: Lessons from the management of red grouse and hen harriers in England. *People and Nature*, 1(1), pp.6-17.

Appendix 1: Research Tools

Semi-structured interview schedule: Non moor owner/worker interviews.

Provide an overview of the research project

Introduction

1. Tell me a little bit about yourself and what you do? (Scene setting –background, job details, experience, length of employment).

The brood management trial

2. What has been your experience of the brood management trial?
 - a. What has been your involvement with the trial?
 - b. Who have you worked with? (other individuals and or organisations)
3. Explain your understanding of the purpose of the Brood Management trial. How will this be achieved?
 - a. Has your experience/knowledge of the trial altered your opinion about the purpose of the trial and how it will achieve its aims?
 - b. Do you think participation in the brood management trial has or may change grouse moor owners, workers and game keepers' attitudes and or behaviours-around hen harrier conservation?
 - c. Do you think the brood management trial has or may change conservationists' attitudes towards game keepers, grouse moor managers and grouse moor owners and hen harriers.
4. What has been good or bad (worked not worked) about the trial and how it has been delivered?
 - a. Is there anything that you think could be changed about the trial at this stage?
 - b. Do you think it is helping to conserve hen harriers?
 - c. Do you think it is changing the attitudes and or behaviours of moor owners, game keepers to hen harriers?

5. Do you think brood management is a suitable solution for long term hen harrier and grouse moor management? Why?

a. What do you think would happen if the stopped?

Relationships and experiences with others during the trial

(Thinking specifically about experiences related to the brood management trial)

2. How would you describe your own personal relationship (if any) with other grouse moor owners, workers and gamekeepers?

a. Has the trial changed your relationship with them? If so, what has changed?

3. How would you describe your own personal relationship (if any) with people who work for other hen harrier/conservation organisations?

a. Has your participation in the trial changed your experience and relationship with them? If so, what has changed?

4. How would you describe your own personal relationship (if any) with organisations that represent uplands communities such as the Moorland Association?

a. Has the trial changed your relationship with them? If so, what has changed?

5. How would you describe your own personal relationship with Natural England staff working on the hen harrier trial?

a. Has your participation in the trial changed your relationship with them? If so, what has changed?

b. What else impacts on this relationship?

Semi-structured interview schedule: Grouse moor owners, workers, gamekeepers.

Provide an overview of the research project

Introduction

6. Tell me a little bit about yourself and what you do? (Scene setting –background, job details, experience, length of employment).

The brood management trial

2. What has been your experience of the brood management trial?

a. What has been your involvement with the trial?

b. Who have you worked with? (other individuals and or organisations)

3. Explain your understanding of the purpose of the Brood Management trial. How will this be achieved?

- a. Has your experience/knowledge of the trial altered your opinion about the purpose of the trial and how it will achieve its aims?
- b. Do you think participation in the brood management trial has or may change other grouse moor owners, workers and game keepers' attitudes and or behaviours-around hen harrier conservation?
- c. Do you think the brood management trial has or may change conservationists' attitudes towards game keepers, grouse moor managers and grouse moor owners.

4. What has been good or bad (worked not worked) about the trial and how it has been delivered?

- a. Is there anything that you think could be changed about the trial at this stage?

5. What do you think about hen harriers on grouse moors?

- a. Has your experience of the trial changed what you think about hen harriers on grouse moors?
- b. Has the trial had an impact on what you do in terms of grouse moor management?

6. Do you think brood management is a suitable solution for long term hen harrier and grouse moor management? Why?

- a. What do you think would happen if the stopped?

Relationships and experiences with others during the trial

(Thinking specifically about experiences related to the brood management trial)

7. How would you describe your own personal relationship (if any) with other grouse moor owners, workers and gamekeepers?

- b. Has the trial changed your relationship with them? If so, what has changed?

8. How would you describe your estates relationship with other grouse moor owners, workers and gamekeepers?

- a. Has the trial changed your estates relationship with them? If so, what has changed?

9. How would you describe your own personal relationship (if any) with people who work for hen harrier/conservation organisations?

- a. Has your participation in the trial changed your experience and relationship with them? If so, what has changed?

10. How would you describe your estates relationship with people who work for hen harrier / conservation organisations?
 - a. Has your estates participation in the trial changed the relationship with them? If so, what has changed? If so, what has changed?
11. How would you describe your own personal relationship (if any) with organisations that represent uplands communities such as the Moorland Association?
 - a. Has the trial changed your relationship with them? If so, what has changed?
12. How would you describe your estates relationship with organisations that represent uplands communities such as the Moorland Association?
 - a. Has your estates participation in the trial changed the relationship with them? If so, what has changed?
13. How would you describe your own personal relationship with Natural England staff working on the hen harrier trial?
 - a. Has your participation in the trial changed your relationship with them? If so, what has changed?
 - b. What else impacts on this relationship?
14. How would you describe your estates relationship with Natural England?
 - a. Has your estates participation in the trial changed the relationship with them? If so, what has changed?
 - b. What else impacts on this relationship?

Appendix 2: Code book

Theme 1: the history of conflict around harriers on the uplands.

This theme encompasses aspects relating to participants discussions about the conflict surrounding grouse shooting and hen harriers, the sense of a lack of acknowledgement about the conservation benefits grouse moor management provides and how this creates anxieties for participation in BM

Reference	Subtheme	N (19) =	Example
1.1	<i>A drive to ban shooting.</i> This subtheme captures discussion around conflict and a sense that it is about banning shooting and the disempowerment of uplands communities not protecting HH.	5	Some people they just want rid of grouse shooting. Some people against any blood spots, so there can be no conversation as far as grouse moors are concerned, they want just want rid of them.
1.2	<i>The role of grouse moors in conservation and maintaining ecological balance on the uplands.</i> This subtheme captures the view that grouse moors contribute to conservation and concerns that unmanaged or rewilded moors will damage habitat and impact on ecological balance.	11	When I was a child, I was actually quite anti, quite anti shooting because I was into birdwatching. But over the years, I evaluated it from both sides, whether it was anti shooting or pro shooting, and my conclusion is providing that it is done sustainably, and with conservation in mind, there's absolutely nothing wrong with it. And a lot of the methods of predator control have changed because there's a lot of people perhaps don't like to see foxes killed. But in actual fact, there's only a relatively few species of birds and mammals that you're actually controlling and the benefits to the general wildlife populations colossal.
1.3	<i>Considerations / reservations about participating in the trial.</i> This subtheme addresses reticence about participating in the trial	6	We had the first nest of Harriers released on our site. Yeah, obviously quite apprehensive, not knowing what it all entails being the first the first release site. I mean, apprehension was probably more so the, the media hype, the twitcher hype, just not knowing if you want to get descended with anti-brood management people. Rather than about the grouse obviously, when the, the young fledglings are released, they're not going to give us any hassle on grouse numbers that season.

Theme 2: *The Spectre of Langholm.*

This theme encompasses information about participant perspectives about the rationale and purpose of brood management. It includes aspects relating to moorland fears about the impact hen harriers can have on grouse numbers as exemplified through Langholm moor Scotland and the way in which brood management may alleviate this fear.

Reference	Subtheme	N (19) =	Example
2.1.	<i>Brood management as mitigation tool against colonisation.</i> This subtheme discusses the view that brood management can reassure owners/keepers as it acts as a mitigation tool for hen harrier colonisation.	10	the issue with the Langholm trial. Where there is no more successful driven grouse shooting. Then that's why I feel very strongly that the brood management trial is a way that we've all got to work to go ahead because that wasn't part of the Langholm trial.
2.2	<i>Brood management a tool to relieve pressure and create balance.</i> This subtheme explores perceptions that brood management is a practical tool in the keeper's toolbox that can be used to relieve pressure and create balance on grouse moors.	8	We have got to find out in this trial, and I'm glad to say we are finding out whether it's feasible to deal with Harrier hotspots, as you can call them. I don't know how much about you know about Harriers, but they have habit, they're not particularly territorial. They don't seem fussed at all to rub shoulders with other Harriers. You can create hotspots. Now clearly hotspots can be a problem. Because three or four hairier nests cheek by jowl does put a heck of a pressure on everything that lives in and around that area. Now, the point of the trial is this, is it possible to relieve pressure? So far it would appear to be the case, yes, we are able to.
2.3	<i>Brood management as a legal tool for managing harriers.</i> This subtheme examines perspectives that brood management creates a legal route through which moors can reduce the impact of harrier predation on grouse and therefore reduce those taking illegal routes.	8	It's a tool that has been available to these people. You know, it allows them you know, it's a legal, it's a legal mechanism that allows them to reduce perceived impact upon have hen harriers on grouse on their estate. So, if they have a buildup of numbers, they can take, you know, they can remove one of those broods legally, and put them back and that that helps them through that process of learning to, you know, to be with to

			live with her and Harriers. So, you know, that's, that's how I think it's, it's has the impact on their hearts and minds.
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Theme 3: The meanings/mechanisms of success and outcomes of the trial.

This theme encompasses perceptions relating to what success means or looks like for different participants in the trial and what they perceive some of the key outcomes have been..

Reference	Subtheme	N (19) =	Example
3.1.	<i>Attitude/ behaviour change.</i> This subtheme specifically looks at participant discussion about attitude and behaviour change as a result of participation in brood management. It includes identification that some will be positive, but some won't change. Acknowledgement that changes take time. But any change will help HH	14	'Grouse moor owners, the majority, I think, not everyone, and many, many more keepers realise that the writing is on the wall. And if we don't do something about it, then we might lose grouse shooting, or we might be licensed. So. either you do something about it, or you blithely go on until it's stopped. Just in the last five years actually, attitudes have changed and will continue to change. But I think we're still a little bit away from what I would say is a complete acceptance by every grouse moor owner and every grouse moor manager and every grouse moor keeper. We're still a bit away from that. But it's getting stronger as each year passes'.
3.2	<i>Mechanisms of change.</i> This subtheme looks at discussions about some of the ways in which the direct participation of those on the trial may be having an impact on the attitude and behaviours of those who have as yet not participated. It includes issues such as social influence and word of mouth, reassuring others from experience of BM.	6	What we have been trying to do is to is to turn the tables to make this successful, successful keepers, successful moors or whatever in achieving whatever to make sure that those keepers are seen as heroes. And I think that is now happening. And hopefully that is then creating, if you like its own peer pressure. So, you are then getting neighboring moors saying, Oh, well, Blimey, they've done it, and that was successful. And it's worked well.
3.3	<i>Ecological success of the trial.</i> This subtheme covers discussion about the success of the trial in terms of bird welfare and population increase and	11	You only have to look at the success of this year, how many hen harriers have fledged from the nests and the majority being from managed grouse moors, to realise that it is working.

	how the increasing population provides evidence of wider attitudinal and behaviour change		
3.4	<i>Support for the continuation of brood management.</i> This subtheme covers discussions about attitudes to ongoing participation and support for brood management to become a permanent tool to assist with ongoing grouse moor management	9	Well, if it's not carried on for another five years, it will be criminal. That will have to be a political decision rather than a sensible one. Because what happened, if you look at the numbers over the last few years, and you think, why would we not keep this going for another five years, at least? And just see what happens next? You're already changing attitudes. It's happening, it's already happening. Five years is nothing in terms of grouse moor management. You know, people have been doing this for generations since the mid-1800s. That's when driven grouse shooting first started. You've got to give it time, you've got to give them proper time.

Theme 4: Interpersonal and interorganisational Relationships

This theme encompasses aspects relating to perceptions about relationships between people and between people and organisations during the trial. It also includes perceptions about the impact brood management has had on them and the implications of these relationships for conflict in the uplands.

Reference	Subtheme	N (19) =	Example
4.1	<i>Relationships (Trust and legitimacy) needed for success.</i> This subtheme looks at discussions about the role that trust at individual and organisational level has and its importance for successful working on the ground.	6	A head Keeper from not far away called be up and said we have a harrier nest for you. Oh, wow. He said you better get up here he said, because there's a bunch of bloody botanists walking up and down looking for rare plants and if they disturb it, and it goes, I'll only get the bloody blame. So for me the fact that that gamekeeper trusted me with that information, and he's a head keeper meant an awful lot.
4.2.	<i>The process of participation.</i> This	11	

	subtheme looks at participant discussions about ways of working on the ground during brood management. What has been good and why?		As its developed, you know, I've made real friendships and had many enjoyable times, you know, working with people from totally sort of non-shooting, and who, in many cases are probably quite ideologically opposed to shooting, you know, a scientist with great integrity, and, you know, they and we can put all that sort of thing one side.
4.3	<i>Natural England's wider relationship with upland managers/keepers and ways of working in the uplands.</i> This subtheme contrasts ways of working discussed in the process of participation theme with experiences of working with Natural England on other issues in the uplands.	9	So, we've got a good relationship on the ground. But that stops there. I mean, the relationship with Natural England and upland managers, keepers, estate owners is absolutely rock bottom. I mean, Like I said before with the field workers on the ground who are similar thinking to what we. So that's works. If NE has field working or officers and people within the structure of Natural England that actually knew what was going on on the ground, then it would make for a better Natural England because everything just seems to be against us. They're not they're not working with us, it's like, no will ban this will ban that will stop them doing this will stop from doing that. There's no positive that come out of it. It's all negative.
4.4	<i>Relationships with ENGOS and raptor conservation organisations.</i> This subtheme examines perspectives about the impact that participation in brood management has had on relationships with ENGOS	9	I speak to quite a lot of Raptor workers and, you know, people that aren't involved in shooting, I have a broad range of friends and I think everyone's got the right to their opinion. But I think the attitudes towards gamekeepers, I think we a lot of good work already, which they don't acknowledge so I can't see them acknowledging this as good work really? But I hope I'm proven wrong, it can't all be negative, but

		they very rarely put anything positive about it.
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Theme 5: Issues with the trial and considerations for the future of BM

This theme encompasses aspects relating to perceptions about what has or hasn't worked well during the trial and why and what could/should be changed if the trial is to become permanent in the future

Reference	Subtheme	N (19) =	Example
5.1	<i>Sustainability of brood management procedures and practices.</i> This subtheme examines perceptions about a number of different procedural/practical issues including cost, security, paperwork, scalability that have impacted upon the trial and which participants raised as points to address in future decisions.	12	It's been very expensive, not that that's affected, Natural England but the Moreland Association, it's been very expensive for them, they've had to tag every bird. And they've had to put 24/7 security on, you know, tags, two and a half 3000 quid a pop, and 24 hour security doesn't come cheap. I think we could move away from tagging every single bird with you know. And I think without, there's not a need for the 24/7 security, we need to back off from that really.
5.2	<i>Issues for consideration about the future sustainability of brood management.</i> This subtheme explores issues raised by participants that have relevance to questions about the future sustainability of brood management trial. It includes issues such as Spa's, receptor sites and colonisation questions.	8	Where are these birds going to go? They've got to be released in that SPA. So, if they are in SPA they stay in that SPA, they are brought back to that spa and they are released in that SPA. So, it is not sustainable for those reasons, it's the cost and it's the density.
5.3	<i>Issues that require attention in terms of effective ways of working to deliver brood management.</i>	8	If the trials to continue, what would we change? I'd want to I'd want a rearing facility that was a lot closer. So, the birds won't be shifted up and

	This subtheme includes participant reflections on issues including the licensing process for brood management, relationships, resources, and brood mixing.		down the country, release sites to be pre identified.
5.4	<i>The need for a communication and engagement strategy.</i> This subtheme examines suggestions about the requirement for better and clearer communication needed internally (within MA and NE) and externally. The desire for more positive stories to combat the negative.	7	I mean, it's interesting, I think, because you try it, you try and Google brood management, and you can't get past the opposition to shooting you can't get past the brood meddling.

Theme 6: Additional considerations for brood management and hen harrier conflict reduction.

This theme encompasses aspects relating to perceptions about the wider context of pressures grouse moors face and the role they play in the acceptance, support and use of brood management. It identifies how brood management is not taking place in a vacuum. There are other issues impacting upon behaviours, attitudes and relationships on the uplands that could help or hinder keepers to help harriers

Reference	Subtheme	N (19) =	Example
6.1	<i>Wider pressures on grouse moors.</i> This subtheme examines perspectives about how brood management is not taking place in a vacuum and how other issues impact upon engagement with it	10	The trial is not going on in a vacuum. It's going on in the background and all the other stuff that's going on. As I said, at the same time as a hen harrier trial been going on. We've changed our approach to licensing controls for gulls for example. In terms of grouse that's probably having a bigger effect is certainly driving them mad and we're pushing on stopping burning on blanket bog that's kind of in their in their minds that's going to have a bigger effect as well. All of these things are cumulative. So that feeling under massive pressure. So, as I say the

			harrier thing is just a part of that is going on against the background of all this.
6.2	<i>Predator control and licensing on grouse moors.</i> This subtheme looks at perceptions about how issues beyond brood management influence attitude and behaviour and how consideration of these might increase engagement with harrier conservation. These include issues associated with diversionary feeding, licensing to control other predators (gulls, corvids etc). Frustration at lack of ability to obtain licenses and suggestions that license could be used as carrots to increase good behaviour. E.g., grant gull licences for those who are participating in brood management.	9	It's a tricky one, because this is not a suggestion, but I suppose it is. Like we said before, it's mouths, isn't it? And if there if there was a potential, I mean, for example, the, you know, the hen Harriers, we've got the problems with the general licenses that causes problems with crows, and then we've got the gulls. You know, the license. We actually, we were lucky enough to get a license for gulls last year, but there are problems around, there's quite a lot of mouths to feed, with all the things that are protected. And that's, you know, that, that long term effect, if they could, I'm not saying be reduced, but if that could be studied and looked at and the problems caused understood. I think, you know, if, if you've got Harriers, but you are already saturated with things like crow's, gulls' ravens and other protective species like buzzards and things that potentially means that your losses to great. Whereas if it was a balance between everything that, you know, hen harriers aren't the only species that eats the grouse, obviously, and that is, you know, so that's one thing, but if you have Harriers and everything else, it's the waders and the things that they can be predated.
6.3	<i>Brood managed and non-brood managed harriers and future population questions.</i> This subtheme examines perceptions about whether brood management has reduced persecution of harriers beyond those released as part of the trial.	4	Now there is one thing that slightly concerns me and that is the first year we lost all the chicks, once they had fledged and there is a 50/50 chance that some of them were shot. we didn't lose any the second year. And I don't think, and I could be wrong, and you need to check this. I don't think the keepers were given the satellite information in the first year. From then on, all the keepers who are involved were given the satellite information as to where the birds were. Which means that any intelligent keeper would have said

			okay, don't shoot any of those. So that slightly concerned me because it's sort of skews the file a little bit
6.4	<i>Questions about longer term balance and sustainability in the uplands.</i> This subtheme looks at participant perspectives around questions raised about what balance on the uplands looks like in the future? How many hen harriers are enough? How many predators are enough? What are sustainable levels of grouse for driven shooting?	11	And I think as well, you need to look at when is enough enough? If it does take off, you know, if there's a point where, you know, I mean, I don't know, 300 pairs does not sound unreasonable to me. But if the 300 pairs on one or two moors, it's a different, it's a different thing. Yeah. And I think, you know, the 10 kilometer I mean, I don't think anything should be set in stone. That's the thing. It needs to be flexible, and you need to talk to people because the whole thing is, is moving on, isn't it? So, you know, if you're not prepared to move in it, you know, there will be perhaps instances, you know, that everyone asked to be flexible on both sides. But I think as long as you get the right people talking to each other, and, you know, don't judge then, you know, I can't see why it can't carry on

Theme 7: Miscellaneous

This theme encompasses aspects relating to data that doesn't sit within the above themes but is of interest.

None – this theme was to allow data that didn't appear to fit within the codebook to be captured and raised with the rest of the team. New themes were either then created to capture these data or existing themes were reviewed and refined to incorporate it.

Appendix 3: Research Methods

1. Introduction

The Joint action plan to increase the English hen harrier population (2016) set out six actions which were agreed to contribute to the recovery of the hen harrier population in England. Action 6 of the plan was Trialling a Brood Management Scheme. Subsequently a Hen Harrier Brood Management Trial – Monitoring and Evaluation Plan (2016) was developed to support the trial. The plan identified 10 evaluation questions that need to be answered by the evaluation in order to assess whether the trial has achieved its objectives, of which question 6 focused on the attitudes of grouse moor owners and managers.

Question 6 in the evaluation plan (2016) tests the hypothesis that, as a result of the availability and practice of brood management, grouse moor owners and managers become more tolerant of hen harriers on their land. The plan noted that the brood management scheme will give persons involved in grouse moor management the confidence to coexist with nearby hen harrier nests and a rising national hen harrier population, because it provides a “safety valve” that would preserve the economic viability of the grouse moor if local hen harrier nesting density were to increase beyond levels which have been scientifically shown to have an impact on grouse. A logic model and a theory of change were developed to identify how this outcome might be achieved in practice. Attitudinal/behavioural change among persons involved in grouse moor management is therefore a central component of ‘success’ for the brood management trial as changing attitudes and behaviours among grouse moor managers is a crucial mechanism by which hen harrier persecution will be reduced.

As this research question refers to changes in attitudes and behaviours, it requires social scientific research to assess whether there has been any change. Previous quantitative research by St. John et.al., (2018), identified how understanding the value orientations and attitudes of stakeholders helps explain differences in levels of support for management approaches, including brood management. The research also identified that it was important to focus on relationships, deliberation, and trust in addition to exploring co-management interventions. This midpoint social science evaluation of the brood management trial will capture these components to identify any attitudinal/behavioural changes that may have occurred during the trial so far, and the factors that have shaped or inhibited them.

2. Methodological background and approach

The objectives of the midpoint social science evaluation of the hen harrier brood management trial were defined as to:

5. Clearly define and analyse the sample of interest i.e. who are the key stakeholder organisations and individuals within them who was involved with the development of the trial;
6. Refine and test the theory of change (included in appendix 1 of this report);
7. Explore perceptions of attitude and behaviour change thus far (and the dynamics between them) amongst those who have participated directly in the trial;
8. Explore and agree best available methods (and associated resourcing) to enable the final social science evaluation to be completed.

Reflecting these objectives, the midpoint evaluation has sought to answer the following specific evaluation questions:

5. To what extent has the project produced the anticipated outcomes among moorland managers participating in the trial? Specifically,
 - a. Changes in managers' attitudes towards hen harriers on grouse moors?
 - b. Changes to grouse moor managers' behaviours around hen harriers on grouse moors?
6. What are the main mechanisms by which outcomes have been produced?
7. Is there any variation in outcomes in different contexts?
8. How effectively has the project been delivered? What, if any, changes are required for the next phase of the project?

The evaluation provides an assessment of perceptions of the behavioural and or attitudinal impacts/outcomes of the trial so far, as well as providing insight into the mechanisms through which these have occurred, particularly as this relates to the theory of change for the trial. As such, using the Government Magenta Book (2020) evaluation guidelines, it adopts a theory-based approach to the process and impact evaluation of the hen harrier brood management trial. Theory based approaches are suited for the evaluation of complex interventions or simple interventions in complex environments and are particularly suited to evaluating the brood management trial because they not only account for what has changed as a result of an intervention, but also explore the mechanisms through which this change has happened (Astbury, & Leeuw, 2010). The theory-based approach fits well with the purpose of the brood management trial project as the approach is iterative, allowing for the theory of change developed at the inception of the trial to be critically examined and adapted according to findings from the evaluation.

The method adopted here has been informed by realist evaluation (Pawson and Tilly, 1997). The realist method of evaluation was chosen as it helps to overcome issues associated with black box evaluation, whereby social programs (such as the brood management trial) are viewed primarily in terms of effects (change in attitude or behaviour to hen harriers), with little attention paid to how those effects are produced (Astbury, & Leeuw, 2010). Instead, the realist approach can be used to direct focus on what is correspondingly referred to as white box evaluation (Kazi, 2003) in which attempt is made to “unpack” the black box so that not only can the evaluation address the effects of a programme, but also the inner workings and operations of its components and how they are connected. This approach is well suited to the current project which is interested not only what, if any, attitude, or behaviour change has occurred but also why – and in what contexts - it has occurred.

2. Design

Evaluation design has been driven by the requirement to test and refine the theory of change and explore attitude and or behaviour change among those that have participated in the trial. This means that engaging with individuals involved in the trial, either as staff working on the project within Natural England or other organisations, or moorland managers on the moors involved in the trial. To achieve this, a semi-structured qualitative semi structured interview design was adopted. This design was chosen as it is recognised that qualitative interviews with participants to uncover implicit assumptions about how a program works links well with white box evaluation and the realist approach (Astbury, & Leeuw, 2010). A qualitative semi structured interview approach also enables flexibility in data gathering (e.g., technology, location) that can help increase participation as well as offering flexibility in subsequent data analysis (deductive and inductive) that sits well with testing and refining the trial’s theory of change.

Qualitative semi-structured interviews are recognised and a vital tool within social science research that generally take the form of a two-way conversation, with discussion and follow-up questions on each point (Newing, 2010). Semi-structured interviews within realist

evaluation also enables the use of theory-driven approaches for questions/topics to be used to test and refine hypotheses about how programmes and interventions work (Manzano, 2016). While not strictly adhering to Pawson and Tilley's (1997) realist interview approach where theories are placed before the interviewee for them to comment on with a view to providing refinement, the current study used both the brood management theory of change from the harrier action plan (2016) as well as the previous research of St. John (2018) on hen harrier management strategies and inter-organisational trust and legitimacy to inform question development and focus for the interviews (see appendix a, b).

When using qualitative rather than quantitative research methods it is important to clarify what criteria can be used for judging the quality of qualitative research. This is so that those less familiar with qualitative research can assess the quality of both the outputs and the processes that led to the generation of the outputs (Guba & Lincoln, 1994). While criteria for judging the quality of quantitative research necessary to achieve the scientific goal of rigour are more widely known, such as reliability, validity (internal and external) and generalisability, it is widely acknowledged that it is problematic to apply them to qualitative approaches (Lincoln and Guba, 1985). For example, while reliability (whether the result is replicable) and validity (whether the means of measurement are accurate and whether they are actually measuring what they are intended to measure) may be useful in providing checks and balances for quantitative methods, they sit uncomfortably in qualitative research which is concerned with more experiential questions about power and influence, context and understanding (Winter, 2000). Similarly, the formal quantitative criteria of generalizability are generally unhelpful and not applicable for qualitative research (Tracy, 2010). This is because statistical generalizations require random representational samples using data that is isolated from any particular context or situation. In contrast, qualitative research engages in-depth studies that generally produce historically and culturally situated knowledge. Accordingly, qualitative research is not designed to be representative but to elicit a range of in-depth views which can be used to help to address both why a programme/intervention is operating as it is (the mechanisms through outcomes may occur) as well as the impact/outcome of the programme/intervention.

Debates about what quality criteria should be applied to qualitative research are contentious (Seale, 1999) and have generated an extensive range of concepts illustrating the creative complexity of qualitative methodologies (Tracy, 2010). While consensus may not have been reached in the same way that it has been for quantitative research (Golafshani, 2003) the work of Lincoln and Guba (1985) is widely accepted as foundational. They suggest the concepts of dependability (instead of reliability) credibility (instead of validity), transferability (instead of generalisability) and confirmability (as a replacement of positivistic notions of neutrality/objectivity) (Lincoln and Guba 1985, p.314).

What determines the dependability, credibility, transferability and confirmability of qualitative research has likewise been debated (e.g., Lincoln, 1995). Broadly speaking, the dependability of a research project can be assessed by the provision of auditing procedures and maintaining a 'decision-trail' whereby the researcher's decisions are clear

and transparent, meaning an independent researcher can understand what has been done and why and if necessary, carry out the research in the same way with potentially comparable findings. In the current report this decision trail is provided within the design, sample, process and analysis sections of this chapter.

The credibility criteria of quality can be demonstrated through a process of sense checking the collection and analysis of data to enable the identification of different views and the way in which the results presented clearly and accurately presents both participants' perspectives and researcher interpretations in order to address the purpose of the evaluation (Noble and Smith, 2015). The provision of thick description (detailed examples from the data and associated analytical discussion), and generation of deductive and inductive knowledge is important for credibility (Tracey, 2010). Again, the sample, process and analysis section of this chapter together with the presentation of data in the analysis chapter will help demonstrate how the current project meets the credibility criteria.

The transferability criteria of quality can be demonstrated through explicit consideration as to whether findings can be applied to other contexts, settings or groups. In other words, has sufficient detail of the context of the fieldwork been provided for a reader to be able to decide whether the prevailing environment is similar to other situations with which they are familiar and whether the findings can justifiably be applied to these other settings (Shenton, 2004). Transferability criteria are thus a combination of both the researcher demonstrating the credibility of the research (as noted above) combined with the reader's understanding and interpretation of the research findings and relevance to their knowledge of other settings and contexts.

Finally, the confirmability criteria can be demonstrated through acknowledging that the methods undertaken, and findings generated are intrinsically linked to the researcher's philosophical position, experiences and perspectives. As Moon et al., (2019) explain, the philosophical position of the researcher frames their theoretical perspective and forms the rationale for the chosen research methods. Therefore, by making explicit why the current research adopted a realist method of evaluation and how this informed the design of the study including the choice to use semi-structured interviews, this project has already provided one means through which to demonstrate the confirmability of this research.

3) Sample

In both quantitative and qualitative studies, researchers must decide the number of participants to select (i.e., sample size) and how to select these sample members (i.e., sampling scheme) (Onwuegbuzie & Collins, 2007). In quantitative studies, power calculations are frequently used to determine in advance which sample size (N) is necessary to demonstrate effects of a certain magnitude from an intervention (Ryan, 2013).

However, as discussed, qualitative research differs ontologically and epistemologically from quantitative research and no similar standards to power calculations for assessment of sample size exist (Malterud, Siersma and Guassora, 2016). Instead, the Magenta book

(2020) identifies that when using qualitative methods for realist evaluation it is important to consider which viewpoints should be included in the evaluation when developing sampling frameworks as this will impact on the sample size. There are no agreed rules of thumb for how many respondents should be selected. The objective is to understand the range of views on a particular topic, and to provide deeper insights into social phenomena. Sampling within qualitative research is therefore different and requires different means of assessment for adequacy of size.

While there is broad agreement that determining qualitative sample size a priori is inherently problematic (Sim et al., 2018), there is a lot of debate and disagreement about what the means of assessment for adequacy of sample size should be (Blaikie, 2020). Linking to the credibility and confirmability criteria of quality in qualitative research discussed above, it is important to situate the sampling criteria used in this project within both the realist approach adopted as well as in relation to the specific purpose of the project. As noted, the realist approach recognises the importance of the subjective information of social actors, of context and of the independent structures that constrain and facilitate behaviours, while offering flexibility in approaches to capture this information. This supports sampling methods within which sufficiency of sample size is assessed by depth and relevance of data to the questions being addressed and correspondingly to a focus on a sample that consists of participants who are best situated to provide information about the research topic (O'Reilly & Parker, 2013). Additionally, in determining how many people would provide sufficient information to enable the purposes of the research to be addressed, the realist approach recognises that sample size is something that can and should be revisited during data collection, in a critically-reflexive, evaluative way (Braun and Clarke, 2016). In this project both the relevance of the sample to the specific purposes of the research as well and the information elicited by semi structured interviews from this sample were reviewed and discussed at numerous points throughout the project.

Given this framing, the research used the concept “information power” as a guide to adequate sample size (Malterud, Siersma and Guassora, 2016). Information power indicates that the more information the sample holds, relevant for the actual study, the lower number of participants is needed. Malterud, Siersma and Guassora (2016) suggest that the size of a sample with sufficient information power depends on (a) the aim of the study (with the more focused the aim the smaller the sample needed), (b) sample specificity (the greater the specificity of experiences, knowledge, or properties among the participants included in the sample the smaller the size needed), (c) use of established theory (a study supported by specific theories for planning and analysis requires a smaller sample), (d) quality of dialogue (a study with strong and clear communication between researcher and participants requires fewer participants to offer sufficient information power), and (e) analysis strategy (a project seeking in-depth analysis of narratives from a few, selected participants would require smaller sample for sufficient information power).

Applying these parameters to this project, the research had clearly specified aims as well as a high level of sample specificity, sampling only from those who have had direct experience with the hen harrier brood management trial rather than others who may have

an interest in it but have indirect knowledge or experience. In terms of established theory, the study used a theory of change to inform data collection and analysis therefore reinforcing sample specificity. Furthermore, the researchers undertaking the semi-structured interviews had extensive experience and expertise in the use of the method and an independent academic steering group reviewed the interview questions before interviews commenced strengthening the quality of dialogue. Finally, the analytical strategy adopted (discussed in more detail below) was selected for its suitability for enabling in-depth analysis of narratives from a few, selected participants (those with direct experience of the trial).

Using the concept of information power to inform sample size recognises that meaning is generated through interpretation of, not excavated from, data (Braun and Clark , 2021), and therefore judgements about when to stop data collection were linked to discussions among the researchers about the developing analysis and its ability to address questions associated with the purpose of the research. This review and reflection process resulted in a total sample size of 19 being deemed sufficient for obtaining information power. This sample consists of 7 staff from within Natural England who have had direct involvement in the trial as well as 12 individuals from outside Natural England who have directly participated in the trial in some capacity (this included moorland owners, gamekeepers, individuals employed to assist in the licensing process and those involved in the brood management itself). The breakdown of the different roles of the 12 external participants will not be included for ethical purposes (protection of anonymity), which will be discussed later in this chapter although quotes will be attributed to roles such as keeper or moor owner within the analysis of the report to provide greater context.

4) Process

The dependability of qualitative research projects can be assessed by the provision of auditing procedures or a 'decision-trail' in which the researcher's decisions are made clear and transparent. This section will describe the processes involved in the design and conduct of the research.

The project aimed to provide social science research and evaluation on progress so far on Action 6 (to trial a brood management scheme) of the Joint action plan to increase the English hen harrier population (2016). The project was informed by step 6 of the Hen Harrier Brood Management Trial – Monitoring and Evaluation Plan (2016) to examine the impact of the trial on the attitude of grouse moor owners and managers. Step 6 specifies that 'the hypothesis being tested is that, as a result of the availability and practice of brood management, grouse moor owners and managers become more tolerant of hen harriers on their land'. As part of the Monitoring and Evaluation plan a 'Theory of Change' (Toc) was developed to underpin this hypothesis (fig 1). At the inception of this evaluation project the theory of change was used to develop a research proposal. As identified previously this proposal had two primary purposes, to test and refine the theory of change and explore any perceptions of attitude and behaviour change thus far amongst those who have participated directly in the trial.

Given that the brood management trial has been contentious, the research team set up an independent academic steering group to offer challenge and guidance to the project as well as to help to ensure dependability and credibility criteria were met. The steering group reviewed and commented on the proposal (including the design, sampling and analysis) and commented on and provided suggestions about the design of the semi-structured interview questions. After these discussions the proposal was finalised and presented to the Hen Harrier Brood Management Board for agreement.

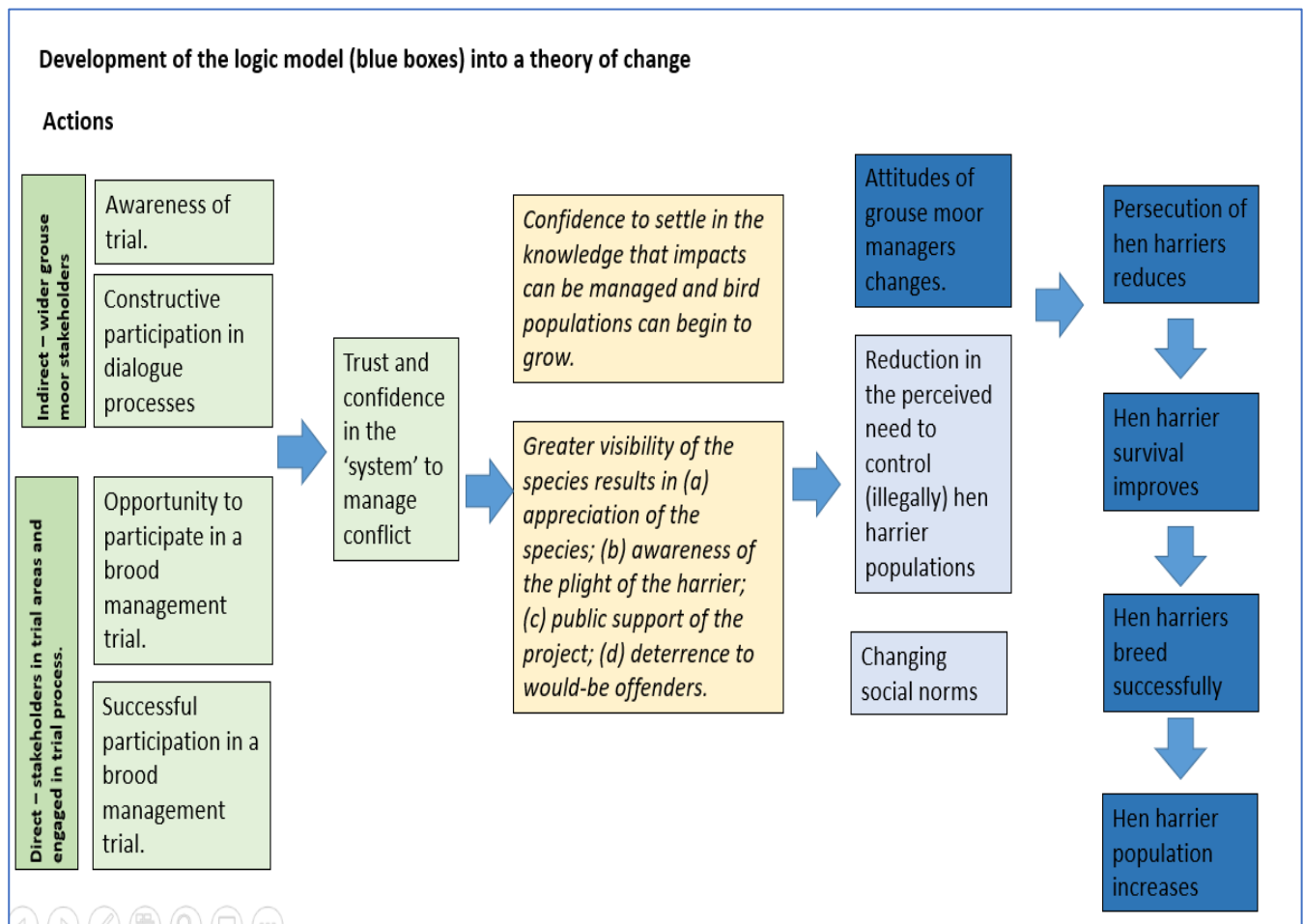


Figure 1. Theory of change of the brood management trial.

The researchers then divided the data gathering between them with one member interviewing staff from within NE about their thoughts and experiences of the brood management trial and the other two interviewing those who had participated in the trial (as owners and keepers on moors where hen harriers had been removed, or who had acted as receptor sites for the release of brood managed harriers as well as those who had involvement in the rearing and release of the harriers or with the licensing and identification of receptor sites). The Moorland Association were able to facilitate our approaches to these individuals and we thank them for their assistance in this as well as those who gave their time to speak to us about their experiences. Interviews were conducted either via the use of Microsoft Teams or by phone with the full audio being

recorded (see ethics and analysis sections for more detail) for transcription and analysis purposes.

5) Analysis

In demonstrating the credibility criteria of quality for qualitative research the choice of technique for analysis and the transparent discussion of the development of the analysis is important to enable readers to see how the lines of inquiry have led to particular conclusions (Nowell et al., 2017). The process of sense checking the collection and analysis of data, the provision of thick description and concrete detail within the analysis as well as explication of deductive and inductive knowledge are therefore all important. The analytical approach adopted should also fit with the wider philosophical framing of the research. The realist approach adopted for this work acknowledges that both the researcher's perspective and that of the research participants regarding the phenomena of study are important and further that claims to the validity of the research is framed by recognition that other perspectives on the phenomenon are also possible (Brooks et al., 2015). A method of analysis was required that allowed for these perspectives to be captured and form part of the analysis process. Furthermore, given the purpose of the research to both test and refine the theory of change as well as capture perceptions of any attitudinal and/or behavioural change among those who participated in the trial, the choice of analytical method also needed to allow for both deductive and inductive analysis (Roberts, Dowell, & Nie, 2019). This is so focus could be given to both a priori themes defined in advance of the analysis process informed by the theory of change, as well themes that developed during the analysis process itself which were judged relevant to capturing participants' experiences and the context informing those experiences that help shed light on the brood management trial.

Template Analysis, sometime called codebook thematic analysis was chosen as the method of analysis (Brooks et al., 2015). It was chosen as it sits somewhere in between positivist orientated approaches to qualitative research and interpretivist ones (Braun and Clarke, 2019) and is therefore well suited to the project's realist framing. It also allows for a collaborative approach to qualitative analysis enabling sense checking between researchers as well as the provision of thick description and both deductive a priori coding, and inductive coding.

Template Analysis is a form of thematic analysis which is a technique for thematically organising and analysing qualitative data. According to Brooks and King (2012) the essence of template analysis is that the researcher produces a list of codes (their 'template') representing issues identified in the textual data. The template is organised in a way which represents the relationship between codes and themes, as defined by the researcher while also providing an audit trail for others to refer to when assessing the outputs of the research thereby demonstrating its credibility and dependability. Template analysis preserves the contextual, subjective nature of the data and lends itself to the deductive and inductive creation of a codebook. Furthermore, the process of collaborative review ensures both consensus about what is meaningful and relevant within the data,

addresses the purpose of the research as well as the consistent application of the codebook to the data. Template analysis has been shown to enable more systematic coding of a dataset than approaches that are more specifically linked to an individual's own interpretive processes and interaction with the data (Brooks et al., 2015).

Like other forms of thematic analysis (e.g., reflexive thematic analysis, Braun and Clarke, 2006), template analysis sets out key procedural steps (6 steps in total) for researchers to follow (Brooks et al., 2015). This procedural guide also provides greater clarity to readers about the process through which the analysis was carried adding to the credibility and dependability of the research. The procedural steps, which have been adapted slightly to reflect the specifics of this project are set out below in figure 2. These steps were shared between the three researchers on the project to follow and the different stages of the analysis involved collaboration between the three researchers.

In line with O'Connor and Joffe (2020) the process first involved the independent coding of a small amount of data (three interviews) by each of the research team before a meeting was arranged and the codes and data discussed to allow informal comparison of codes and initial themes to be explored and developed. This led to the development of an initial codebook, which was reapplied by the first author to the initial three interviews. The codebook and data captured by it were then further reviewed and discussed between the research team to further refine the codebook before it was then applied by the first author to the remaining larger set of data. The code book included a miscellaneous theme to allow data that didn't appear to fit within the codebook to be captured and raised with the rest of the team. New themes were either then created to capture this data or existing themes were reviewed and refined to incorporate it.

This iterative (re-) development of the codebook and the subsequent coding structure is a vitally important part of Template analysis (Brook and King, 2012). Within this process, it was also important to recognise when to stop refining the code book and coding data. As with Brooks and King (2015) pragmatic decisions about when the analysis had met the needs of the research project (allowing the purpose of the project to be addressed) and about resource availability determined this.

Step 1	Data Familiarisation	Read sample of transcripts (one NE, one owner, one keeper). Read each through without making notes. Continue this reading process a few times (3 each document).
Step 2	Carry out preliminary coding of the data	Using the priori coding frame on the next page (the TOC and key questions on next slide) to guide you use the comment function on word to highlight any text that you think are interesting and/or relevant to these research objectives. Put a few words into the comments box that you feel describes or defines what is being said in that text (code). Also highlight and provide codes for any text that isn't directly related to TOC or key questions, but you think are interesting/pertinent to inform understanding of use and experience of HHBMT (inductive codes).
Step 3	Generate emerging themes	Organize the data (coding) into emerging themes. This phase begins when all relevant data items have been coded. The focus shifts from the interpretation of individual data items within the dataset, to the interpretation of aggregated meaning and meaningfulness across the dataset. The coded data is reviewed and analysed as to how different codes may be combined according to shared meanings so that they may form themes or sub-themes. Think about how these themes relate to each other (if at all). What is important is that the pattern of codes and data items communicates something meaningful that helps answer the research question(s). To help try writing a paragraph in your own words that tells the story of each transcript and then a paragraph that tries to link these three stories (e.g. any emerging themes).
Step 4	Define initial coding template	It is normal in Template Analysis to develop an initial version of the coding template (see final slide) based on a subset of the data rather than carrying out preliminary coding and clustering on all accounts before defining the thematic structure. We will do stage four when we meet in January – review our coding and themes – the story's we have written. Develop thematic map to sit alongside development of coding template. We will then reapply to the three transcripts to assess fit and then apply to one further transcript collaboratively.
Step 5	Apply initial template more data and refine as necessary	Apply to remaining transcripts. Examine fresh data and where material of potential relevance to the study is identified consider whether any of the themes defined on the initial template can be used to represent it. Where existing themes do not readily “fit” the new data, modification of the template may be necessary. New themes may be inserted and existing themes redefined or even deleted if they seem redundant
Step 6	Finalize template and apply to full data set	A good rule of thumb is that development of a template cannot be seen as sufficient if there remain substantial sections of data clearly relevant to the research question(s) that cannot be coded to it.

Table 1. The six steps of the Template Analysis process.

5) Ethics

The Hen Harrier Midpoint Research Evaluation adheres to the five key ethical principles identified within the GSR Professional Guidance Ethical Assurance for Social Research in Government document.

1. **Sound research methods and appropriate dissemination and utilisation of the findings.** Ensuring the research meets a clear organisational need, doesn't place any unnecessary burden on respondents, and is based on sound methods that ensure evidence is robust, usable and accessible
2. **Participation based on valid informed consent** – it is clearly voluntary and participants have sufficient information to decide whether to take part
3. **Enabling participation** through method and sample design, with consideration given to likely barriers to participation and reasonable steps taken to address these
4. **Avoidance of personal and social harm** including avoidance of undue stress.
5. **Non-disclosure of identity and personal information** ensuring confidentiality and data protection and that participants are not identified or identifiable in research outputs.

The research proposal, the interview questions and an information and consent sheet were developed for the research and reviewed by an independent academic steering group. Once comments and suggestions were made and documents revised, they were then presented to the Natural England ethics committee who were able to review and ask questions about it. The study only continued once ethical approval had been obtained from this panel.

Participants were provided with an information and consent sheet in advance of the interviews and asked to read and either return a signed copy or confirm via email that they had read about the study and its ethical guidelines they were happy to participate. At the beginning of each interview participants were taken through the information and consent form and asked to verbally provide consent. They were given the opportunity to ask any clarification questions before the interviews commenced. Only once this consent had been noted did interviews begin.

Interviews were recorded via Dictaphone or Microsoft teams and then transcribed in full using the digital transcription software Otter.AI. The audio recordings, together with the written transcripts were saved onto a dedicated Share Point Online Site that had access restricted to the three members of the research team.

All interviewees were then assigned an alphanumeric code to help make their identities anonymous. Transcripts were then also read and names and identifying details of participants or others were then removed and replaced with XX XX in the text.

