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RESEARCH ARTICLE



Value diversity and conservation conflict: Lessons from the management of red grouse and hen harriers in England

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Abstract

1. Conflicts between people over wildlife management are damaging, widespread, and notoriously difficult to resolve where people hold different values and world-views. Cognitive approaches examining steps from human thought to action can help us understand conflict and explore strategies for their management.
2. We focused on the conflict between hunters and conservationists over the management of red grouse (*Lagopus lagopus scoticus*) and hen harriers (*Circus cyaneus*) in the English uplands which represents a classic, persistent conflict, where human dimensions are poorly understood.
3. Guided by conceptual frameworks from social and environmental psychology, we conducted a questionnaire-based study to assess wildlife value orientations of key stakeholders. We quantified attitudes towards hen harriers, grouse shooting, gamekeepers, and raptor conservationists. We also measured support/opposition for harrier management strategies in England and investigated trust in the responsible government authority.
4. We present data from 536 respondents from field sport or nature conservation organizations. Respondents were categorized according to the primary objectives of their affiliated organization: Field sport (i.e., hunters), Non-raptor, Pro-raptor, and Pro-bird (i.e., organizations promoting conservation of birds excluding raptors, raptors specifically, or birds generally).
5. Utilitarian value orientations were prominent among Field sport and Non-raptor respondents. Most Pro-raptor and Pro-bird participants held mutualist value orientations, indicating they did not support shooting or management of wildlife.
6. As suggested by the cognitive hierarchy, we found strong correlations between attitude and support for management options, our proxy for behaviour.
7. Pro-bird affiliates showed clear preference for less invasive management, and along with Pro-raptor respondents did not support brood management (removal and later release of eggs/young when harrier density is high). Field sport individuals expressed a degree of support for all management types. Trust in Natural England was limited.
8. Understanding value orientations and attitudes of stakeholders helps explain differences in levels of support for management approaches. Our study highlighted

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strongly divergent beliefs. Such positions are hard to change. Increasing the level of ecological knowledge alone is unlikely to facilitate conflict management. Instead, conflict management would benefit from combining such knowledge with a focus on relationships, deliberation, and trust in addition to exploring comanagement interventions.

KEYWORDS

conflict, conservation psychology, perceptions, hen harrier, predator, red grouse, trust, wildlife value orientations

1 | INTRODUCTION

Conflict between people over the management of wildlife is widespread (Redpath, Gutiérrez, Wood, & Young, 2015). Such issues are notoriously complex and difficult to resolve as they often involve parties with different identities, values, and worldviews. Identifying and agreeing upon interventions in such “wicked” settings is challenging, in part because we need a cross-disciplinary approach to address these problems (Mason et al., 2018). Even if the ecology is understood, and management put in place to minimize wildlife impact, underlying social conflicts are likely to continue if they are driven by deep-seated value differences (Madden & McQuinn, 2014; Manfredi et al., 2017). Scholars from diverse fields including anthropology, geography, and history have explored connections and interactions between humans and nonhuman animals (DeMello, 2012). For example, through an anthropological lens, Whitehouse (2009) investigated “the goose problem” on Islay, Scotland; Duffy and Moore (2010) examined the political ecology of human–animal relationships in the context of elephant tourism; and Pooley (2016) interrogated environmental histories of human relations with Nile

crocodiles. Inspired by its applied nature, here we focus on human dimensions of wildlife research which aims to evaluate public opinion regarding species and their management in order to inform management decisions (Manfredi, 2008).

Cognitive approaches that examine concepts underpinning the step from human thought to action can help us understand people's behaviour and social conflicts. According to socio-psychological theory, an individual's view of the world can be organized according to a cognitive hierarchy consisting of values, basic beliefs that determine value orientation, attitudes and norms, behavioural intentions and behaviour (Figure 1). These cognitions are presumed to build upon each other. For example, values, which are 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. Values in this sense, which differ from value as preference or value as a contribution to a goal (Tadaki, Sinner, & Chan, 2017), transcend specific situations, thus someone holding honesty as a value would express this in their attitudes across multiple topics (e.g., law compliance and interactions with friends). In turn, these attitudes would lead a person to behave in a manner consistent with this value (e.g.,

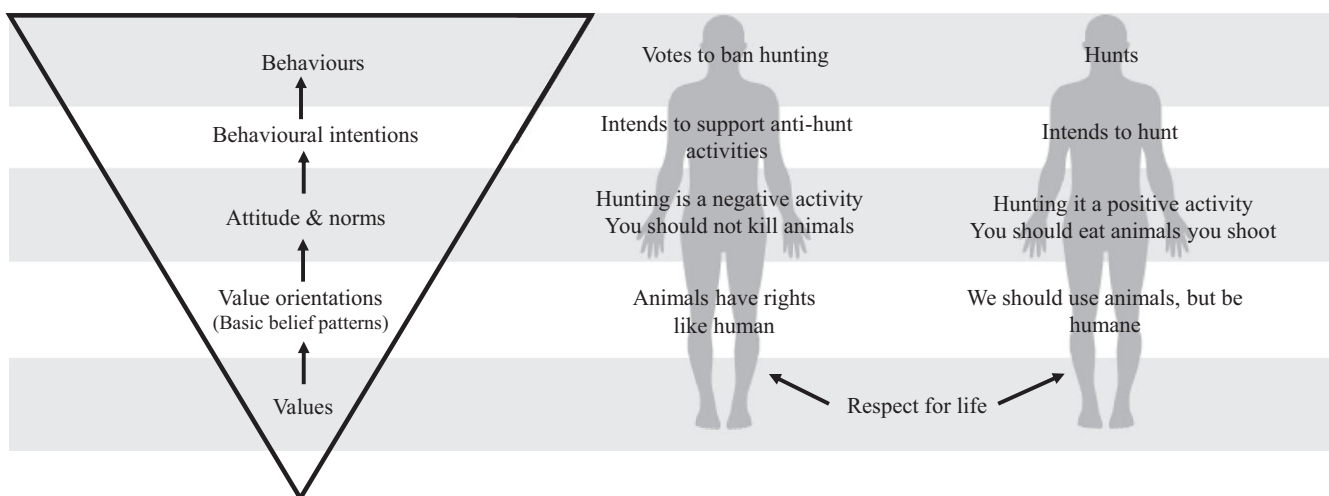


FIGURE 1 The cognitive hierarchy (left) consists of general cognitions (values and value orientations) and specific cognitions (attitudes and norms) which underpin behavioural intentions and behaviours. An underlying value concerning “respect for life” may take divergent paths. For example, one's values may orientate towards animals having rights equal to people or, in contrast, towards humane use of animals. Such differences in value orientation ultimately result in different behaviours, in this example, voting to ban hunting compared to engaging in hunting. Adapted from Vaske and Manfredi (2012). Human icon by Freepik

they would complete tax returns and be honest with their friends) (Manfredo, 2008; Vaske & Manfredo, 2012). Basic beliefs, which define how people apply specific values to their lives, sit between values, and attitudes and norms in the cognitive hierarchy. While individuals may share the same first-order value, such as respect for life, they may differ in their basic beliefs associated with this value (Figure 1; Vaske & Manfredo, 2012). Because value orientations ultimately influence behaviour, understanding them in relation to wildlife can help managers predict support for interventions (Vaske & Donnelly, 1999; Vaske & Manfredo, 2012). Indeed, Chan et al. (2016) outlined how a more robust consideration of relational values, which concern all manners of relationships between people and nature, including relationships between people that involve nature, would lead to more productive policy approaches.

Two predominant value orientations have been identified in relation to wildlife: utilitarianism and mutualism. Individuals holding a utilitarian wildlife value orientation believe wildlife exists for human use and enjoyment and that it should be managed to benefit people. Conversely, mutualists believe in the harmonious coexistence of humans and wildlife and that wildlife is deserving of rights similar to people (Jacobs, Vaske, & Sijtsma, 2014; Whittaker, Vaske, & Manfredo, 2006). People can also be classified as holding pluralist or distanced wildlife value orientations. Pluralists hold both utilitarian and mutualist beliefs and the expression of one view over the other is influenced by context; distanced individuals do not advocate either perspective indicative of a limited connection to wildlife and little interest in wildlife issues (Teel & Manfredo, 2010). Wildlife value orientations have helped explain patterns of human behaviour relating to wildlife in a number of studies (e.g., Fulton, Manfredo, & Lipscomb, 1996; Jacobs et al., 2014; Teel & Manfredo, 2010; Vaske & Donnelly, 1999). For example, individuals holding mutualistic value orientations towards forests were significantly more likely to hold proforest-preservation attitudes and intended to vote in support of forest preservation, compared to individuals holding utilitarian value orientations (Vaske & Donnelly, 1999). In contrast, individuals holding utilitarian value orientations showed limited support for the reintroduction of wolves or bison to Germany compared to people holding mutualistic value orientations (Hermann, Voß, & Menzel, 2013). Management actions designed to address conservation conflicts may not therefore be accepted unanimously as stakeholders may vary in their wildlife value orientations and thus in what actions they deem to be acceptable (Jacobs et al., 2014).

The persistent conflict between hunting and conservation interests over the management of red grouse (*Lagopus lagopus scoticus*) and hen harrier (*Circus cyaneus*) in the UK uplands represents a classic example of how research has focussed on ecology (Elston, Spezia, Baines, & Redpath, 2014; Thirgood & Redpath, 2005, 2008). Grouse management occurs on private estates in heather (*Calluna vulgaris*)—dominated moorlands—a habitat of international conservation interest (Thompson, MacDonald, Marsden, & Galbraith, 1995). In England, much of the grouse management is intensive and focused on delivering large numbers of birds for shooting. Predation by raptors, in particular hen harriers, can, in certain circumstances,

significantly limit red grouse populations reducing the number available to shoot and thus the economic viability of driven grouse shoots (Sotherton, Tapper, & Smith, 2009; Thirgood et al., 2000). Consequently, harriers and other raptors, although protected under UK legislation since 1952, are illegally killed on grouse moors (Amar et al., 2012; Redpath, Amar, Smith, Thompson, & Thirgood, 2010). The extent of illegal persecution means harriers are virtually absent from intensively managed grouse moors across the United Kingdom (Redpath et al., 2010). The conflict is highly political and constantly changing, but in essence, it is between those who wish to minimize the impact of harriers on grouse populations, sometimes through illegal killing of harriers, and advocates of harriers who demand that the law be upheld before any compromising solutions be considered (Thirgood & Redpath, 2008). Increasingly, however, arguments employed by conservationists are shifting towards broader impacts of grouse management on upland ecosystems as a whole (Avery, 2015; Thompson et al., 2016).

Although there is general agreement about the evidence of the ecological relationships between harriers and grouse, there is much less agreement about management. Suggested strategies have included: diversionary feeding of harriers to reduce predatory impact on grouse; reintroduction of harriers away from grouse moors; removing eggs/chicks from nests when harrier density is high, rearing in captivity and releasing (brood management); licencing grouse moors to ensure sustainable and legal management practices; and banning driven grouse shooting (Avery, 2015; Harper, 2018; Redpath, Thirgood, & Leckie, 2001; Thirgood & Redpath, 2008). Of these, diversionary feeding has been trialled at one site and found to be effective at reducing the number of grouse chicks eaten by harriers (Redpath et al., 2001). Despite this, feeding has not been widely taken up on grouse moors. Other methods have not been trialled. Studies have examined the ecology of this conflict and on developing mitigation to reduce the impact of predation on grouse stocks. So far, such approaches have failed to reduce the conflict. The critical human dimensions have been much less studied (Hodgson, Redpath, Fischer, & Young, 2018; Marshall, White, & Fischer, 2007), yet are essential to the development of conflict management strategies (Thirgood & Redpath, 2008).

There is currently no dialogue process in place to support conflict management in the conflict over harrier and grouse management in England. Previous dialogue searching for shared solutions was established in 2005 (Elston et al., 2014). However, this was unsuccessful as conservation organizations withdrew from the process, partly because harriers continued to be killed illegally, becoming locally extinct as a breeding bird in England in 2013. This led to the UK Government's Department for Environment, Food and Rural Affairs (DEFRA), via Natural England, taking over the process and producing the joint action plan to increase the English hen harrier population. The plan includes six actions: monitoring harrier populations in England and the UK; diversionary feeding; improving intelligence and enforcement; nest and winter roost protection; a reintroduction into southern England on land not associated with grouse shooting; and a trial brood management scheme. Brood management entails

eggs or young from one nest being removed, raised in captivity and later released if two harrier nests occur within 10 km (DEFRA, 2016).

Our study aimed to explore factors associated with support/opposition for the different interventions proposed in the Action Plan. We targeted a range of organizations taking positions on different sides of the debate from profield sports (i.e., hunting, shooting, fishing) to proraptor (specializing in raptor protection) NGOs. Specifically, the aims of this study were to: (i) assess wildlife value orientations; (ii) quantify attitudes towards hen harriers, maintaining a rural way of life, grouse shooting, gamekeepers, and raptor conservationists; (iii) understand perceptions towards the Action Plan management strategies; and (iv) investigate levels of trust in Natural England as the responsible government authority. Such insight will help in understanding why conflict persists and guide its effective management.

2 | MATERIALS AND METHODS

Questionnaire construction was guided by conceptual frameworks developed in social and environmental psychology (e.g., Fulton et al., 1996; Marshall et al., 2007; Manfredi, 2008; Teel & Manfredi, 2010) that aim to understand human actions towards wildlife. The questionnaire (Supplementary Information) consisted of six core sections. First, we explored respondents' basic knowledge and experience of harriers. Second, basic beliefs were measured by asking respondents to indicate their level of agreement with nine belief statements about wildlife management, shooting and equality between people and wildlife (Supporting information Table S1). These statements were adapted from previous studies (Fulton et al., 1996; Whittaker et al., 2006; Zainal Abidin & Jacobs, 2016) to suit the harrier/grouse management context. Together, the scores from these statements formed an index that described where respondents sat on the utilitarian-mutualist continuum, that is, their wildlife value orientation (Manfredi, 2008; Teel & Manfredi, 2010). Third, 19 statements investigated specific attitudes towards: harriers on the English uplands; the importance of harrier conservation compared to maintaining a rural way of life; grouse shooting; gamekeepers; and raptor conservationists (Supporting information Table S2). Fourth, participants were asked to express their level of support for current and proposed management options defined in the Action Plan. Fifth, for each management option, respondents indicated how much the approach would increase the number of harriers in England, reduce impact of harriers on red grouse, reduce disagreements between stakeholders, and reduce illegal harrier killing. Lastly, using a 5-point scale, respondents indicated their level of trust in Natural England (strongly distrust = -2; strongly trust = 2). Respondents could select "Don't know" or similar (e.g., not applicable) throughout. The questionnaire was piloted among colleagues and members of DEFRA's Brood Management Working Group with minor edits made prior to data collection.

2.1 | Data collection

We disseminated the online questionnaire (SurveyMonkey) through eight organizations that represented the interests of field sports and birds. Organizations were provided with a unique web link to the questionnaire embedded within email text introducing the study. Invitations were only sent to members residing in England as management approaches differ elsewhere in the United Kingdom. Where >400 members fulfilled this criteria, invitations were sent to a simple random sample of individuals. Our study was approved by Bangor University Ethics Committee (approval number cns2017fsj01).

2.2 | Analysis

Prior to analysis, data from the eight organizations were combined. Respondents were assigned to one of four categories according to the primary objectives of their affiliated organization: "Field sport" (i.e., hunting, shooting, fishing); "Non-raptor" (focusing on the protection of nonraptors); "Pro-raptor" (specializing in raptor protection); and "Pro-bird" (involved in nonraptor and raptor protection).

Statements measuring basic belief items were coded such that high scores were indicative of utilitarian responses before wildlife value orientations were assessed. Confirmatory factor analysis (CFA) was conducted to test whether the a priori groupings of variables into wildlife belief dimensions and wildlife value orientation domains were a good fit to the data (Fulton et al., 1996; Teel & Manfredi, 2010). The CFA's were performed using principal axis factoring with orthogonal (varimax) rotation. Reliability of variable groupings was confirmed using Cronbach's alpha (a measure of how closely related a set of variables are) and thus average scores across each of the dimensions and domains were calculated. We assessed the internal consistency of statements measuring attitudes in five topics using Cronbach's alpha before calculating average individual-level attitude scores per topic.

We used one-way analysis of variance (ANOVA) and post hoc tests (Tukey's HSD) to assess differences in respondent affiliation, wildlife value orientation, and attitudes. Pearson's *r* was used to investigate the relationship between wildlife value orientations and attitudes; attitudes and support for management; and participant affiliation and trust in NE. All analyses were conducted in SPSS (version 24).

3 | RESULTS

Of 2,807 invited participants, 555 responded. Records where no questions were answered were deleted ($n = 19$), leaving data from 536 respondents affiliated to Field sport ($n = 142$), Non-raptor ($n = 145$), Pro-raptor ($n = 147$), and Pro-bird ($n = 102$) organizations. Most respondents were aware of the Action Plan (86.4%) but less than half (39.6%) had read it.

3.1 | Basic beliefs and wildlife value orientation

Confirmatory factor analysis provided factor loadings that supported the a priori grouping of the nine basic belief statements into three dimensions named “Wildlife Management,” “Shooting,” and “Equality between people and wildlife” reflecting the content of the statements incorporated into each dimension (Supporting Information Table S1). This analysis shows, for example, that the five statements designed to measure basic beliefs towards shooting, do indeed measure one underlying “latent variable” which we have called Shooting. The reliability of our three basic belief dimensions was confirmed by Cronbach's alpha which ranged from 0.52 to 0.92 (Supporting Information Table S1).

The second factor analysis of respondents' basic belief dimension scores identified two wildlife value orientation domains defined as Species Management, which encompassed basic beliefs concerning Wildlife Management and Shooting, and Equality between people and wildlife (“EqualityCOR(20”). Respondents were then categorized into wildlife value orientations according to their scores on Species Management (median = 0.5) and Equality (median = -0.5), with high scores being above the median in each domain. This scoring revealed four categories along the two dimensions to which we assigned the labels Utilitarian, Pluralist A, Pluralist B, and Mutualist (Table 1). Respondents categorized as Utilitarian scored high for both Species Management and Equality, which indicated that they held a view of human mastery of nature and prioritized human well-being over the rights of wildlife. Individuals assigned to the Pluralists A category accrued high scores indicative of support for Species Management but scored low on Equality showing they not only supported Wildlife Management but also consider wildlife deserving of rights. Pluralist B individuals did not advocate a wholly utilitarian or

mutualist view; they scored low on Species Management and high on rights, indicating a lack of support for shooting or management, but not due to being advocates of wildlife rights. Mutualists scored low on Species Management and low on Equality, indicating that they did not support shooting or management of wildlife, and viewed wildlife to be somewhat equal to humans and deserving of rights.

Mean wildlife value orientation scores differed significantly between Utilitarian, Pluralist A, Pluralist B, and Mutualist respondents (Species Management ($F(3,491) = 522.41, p < 0.01$; Equality ($F(3,491) = 389.16, p < 0.01$). Post hoc tests (Tukey's HSD) revealed that support for Wildlife Management and Shooting was lower among people holding Mutualist and Pluralist B value orientations, compared to Utilitarian or Pluralist A orientations. In contrast, people holding Utilitarian and Pluralist B value orientations supported arguments that indicated the needs of people are more important than the rights of animal, when compared to people classified as Mutualist or Pluralist A.

While there is variation in wildlife value orientation within affiliations (e.g., 51.2% of Field Sport respondents hold Utilitarian value orientations, 43.8% Pluralist A, 1.7% Pluralist B, and 3.3% Mutualist), the majority (51.2%) of Field Sport affiliates, and many (39.7%) associated with Non-raptor organizations reported Utilitarian value orientations in keeping with human domination of wildlife. Pluralist A values, indicative of support for Wildlife Management and a degree of Equality between human and wildlife were also common in these groups (43.8% and 39.7% respectively). In contrast, most individuals associated with Pro-raptor or Pro-bird organizations held Mutualist value orientations (71.6% and 75.6% respectively) indicating that they did not support Shooting or Wildlife Management and viewed wildlife to be somewhat equal to humans and deserving of rights. Pluralist B orientations, indicating a lack of support for Shooting or Management but prioritization of human well-being over the rights

TABLE 1 Mean wildlife value orientation scores of respondents categorized as Utilitarian, Pluralist, and Mutualist (minimum = -2, maximum = 2; higher scores indicate utilitarian values). The two pluralist categories represent different combination of utilitarian and mutualist values: People categorized as Pluralist A support Species Management and perceive wildlife deserving of rights; those categorized as Pluralist B do not support Species Management and prioritize human needs over wildlife rights. Below, the percentages of respondents fitting into each wildlife value orientation category according to organizational affiliation are presented

Wildlife value orientation domains (bold) and basic belief dimensions	Wildlife value orientations			
	Utilitarian (n = 121) Mean (SE)	Pluralist A (n = 119) Mean (SE)	Pluralist B (n = 41) Mean (SE)	Mutualist (n = 185) Mean (SE)
Species management	1.40 (0.04)	1.18 (0.04)	-0.43 (0.10)	-0.52 (0.04)
Wildlife management beliefs	1.30 (0.06)	1.13 (0.06)	-0.60 (0.15)	-0.40 (0.06)
Shooting beliefs	1.50 (0.05)	1.23 (0.06)	-0.26 (0.15)	-0.64 (0.06)
Equality between people and wildlife	0.59 (0.05)	-1.01 (0.04)	0.33 (0.08)	-1.29 (0.04)
Beliefs in needs of people coming before wildlife	0.59 (0.05)	-1.01 (0.04)	0.33 (0.08)	-1.29 (0.04)
Affiliation				
Field sport (i.e., hunting, shooting, fishing)	51.2	43.8	1.7	3.3
Non-raptor (focusing on the protection of nonraptors)	39.7	39.7	6.6	14.0
Pro-raptor (specializing in raptor protection)	6.0	9.0	13.4	71.6
Pro-bird (involved in nonraptor and raptor protection)	3.3	6.7	14.4	75.6

of wildlife were also present in these groups (13.4% and 14.4% respectively) (Table 1).

3.2 | Attitudes

Reliability analysis revealed high internal consistency for sets of attitude statements within the five core areas measured; Cronbach's alpha ranged from 0.69 to 0.85 (Supporting Information Table S2). Consequently, average scores for each attitude realm were calculated for individuals. There were statistically significant differences between respondent affiliation and their attitudes towards harriers on the English uplands ($F(3,439) = 117.57, p \leq 0.001$), the importance of harrier conservation compared to maintaining a rural way of life ($F(3,444) = 168.75, p \leq 0.001$), grouse shooting ($F(3,401) = 280.94, p \leq 0.001$), gamekeepers ($F(3,443) = 110.13, p \leq 0.001$), and raptor conservationists ($F(3,450) = 95.71, p \leq 0.001$) (Figure 2). Post hoc tests revealed no significant differences between attitudes held by Field Sport and Non-raptor-affiliated individuals ($p = 0.48, 1.10, 0.90, 0.92$ and 0.72). Respondents affiliated to these types of organizations generally reported more negative attitudes towards harriers in the uplands, the importance of harrier conservation compared to maintaining a rural way of life, and raptor conservationists. Compared to other groups, they also reported more positive attitudes towards grouse shooting and gamekeepers. Individuals associated with Pro-raptor or Pro-bird organizations did not differ significantly in their attitudes towards harriers in the uplands ($p = 0.21$), gamekeepers ($p = 0.59$), or raptor conservationists ($p = 0.98$). However, Pro-raptor and Pro-bird respondents did differ significantly in their attitudes towards the importance of harrier conservation compared to maintaining a rural way of life ($p = 0.03$) and attitude towards grouse shooting ($p \leq 0.001$). Pro-bird respondents reported more Mutualist views than any other group; they supported harrier conservation over maintaining a rural way of life and held negative attitudes towards grouse shooting (Figure 2).

Across all respondents, values associated with Species Management and Equality were significantly related to respondent's attitudes (Supporting Information Table S3). For example, as wildlife value orientation scores increased, indicative of more utilitarian values, attitude towards harriers on the English uplands declined (Species Management $r = -0.62, p \leq 0.001$; Equality $r = -0.46, p \leq 0.001$) while attitude towards Shooting became more positive (Species Management $r = 0.77, p \leq 0.001$; Equality $r = 0.43, p \leq 0.001$).

Across all respondents, 80% of the correlations between attitudes and support for management were significant (Supporting Information Table S4). As attitude scores towards harriers increased, indicative of more Mutualist views, so too did support for monitoring ($r = 0.64, p \leq 0.001$), improving intelligence ($r = 0.65, p \leq 0.001$), and nest and roost protection ($r = 0.73, p \leq 0.001$) while support for brood management declined ($r = -0.24, p \leq 0.001$). As attitudes towards shooting became more positive, indicative of more Utilitarian views, so too did support for more invasive forms of management (e.g., brood management $r = 0.51, p \leq 0.001$). In other words, where individuals sat on the Utilitarian-Mutualist spectrum influenced their attitudes and these attitudes were related to expressions of support/opposition for different management options.

3.3 | Within-group differences in levels of support for harrier management

Unlike all other groups, Field sport respondents reported statistically similar levels of support for all management approaches (Field sport $F(5,700) = 1.88, p = 0.10$; Non-raptor $F(5,722) = 10.95, p < 0.001$; Pro-raptor $F(5,798) = 84.1, p < 0.001$; Pro-birds $F(5,550) = 255.76, p < 0.001$) (Figure 3, Supporting Information Table S5). Post hoc tests revealed that Non-raptor respondents reported significantly lower levels of support for a southern reintroduction ($M = 0.05, SD = 1.22$) compared to other management

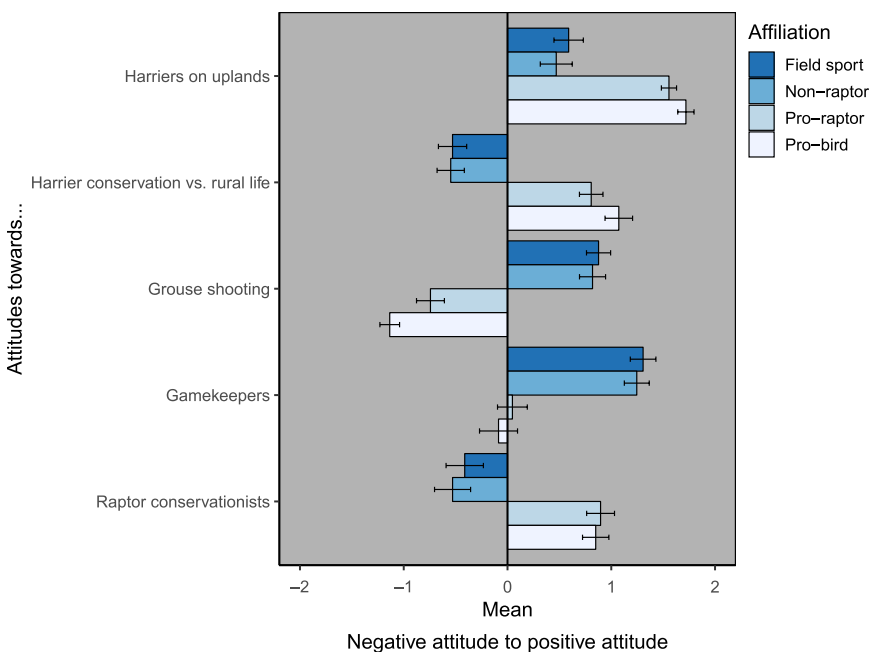
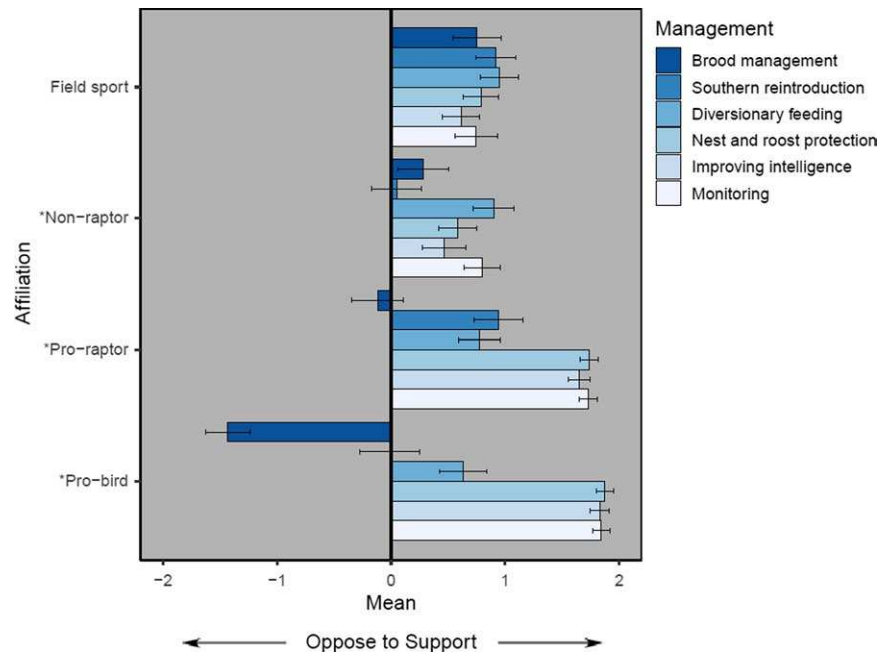


FIGURE 2 Mean scores to attitude statements concerning five topics: the existence of harriers on the English uplands; the importance of harrier conservation compared to maintaining a rural way of life; grouse shooting; gamekeepers; and raptor conservationists. Data are grouped according to respondent affiliation: “Field sport” (i.e., hunting, shooting, fishing); “Non-raptor” (focusing on the protection of nonraptors); “Pro-raptor” (specializing in raptor protection); and “Pro-bird” (involved in nonraptor and raptor protection). Error bars show 95% confidence interval

FIGURE 3 Mean level of support for each of the six management options: the trial brood management scheme; a reintroduction into southern England; diversionary feeding; nest and winter roost protection; improving intelligence and enforcement; and monitoring harrier populations in the United Kingdom. Data are grouped according to respondent affiliation: “Field sport” (i.e., hunting, shooting, fishing); “Non-raptor” (focusing on the protection of nonraptors); “Pro-raptor” (specializing in raptor protection); and “Pro-bird” (involved in nonraptor and raptor protection). Error bars show 95% confidence intervals. Statistically significant differences within groups are denoted by an asterisk



approaches; their support for the reintroduction did not differ significantly to the low level of support they reported for brood management ($M = 0.28$, $SD = 1.23$). Within Pro-raptor and Pro-bird respondents, monitoring, nest and roost protection, and improving intelligence received high and statistically similar levels of support. In contrast, these groups reported significantly lower levels of support for brood management compared to any other management approach ($M = -0.12$, $SD = 1.30$; $M = -1.43$, $SD = 0.93$ respectively).

3.4 | Between-group differences in levels of support for harrier management

With the exception of diversionary feeding which was generally backed by all groups, levels of support for management options varied significantly by respondent affiliation (Supporting Information Table S6; Figure 3). Pro-raptor and Pro-bird respondents reported statistically similar and significantly higher levels of support for monitoring, nest and roost protection, and improving intelligence compared to Field sport and Non-raptor respondents. Levels of support for brood management differed significantly among groups; support was highest among Field sport followed by Non-raptor affiliates. However, their average levels of support for this management approach were conservative, ranging from $M = 0.28$ ($SD = 1.23$, Non-raptor) to $M = 0.75$ ($SD = 1.15$, Field sport) where 0 = Neutral and 2 = strongly support. Pro-bird respondents reported significantly greater opposition to brood management which was also opposed by Pro-raptor affiliates. Levels of support for a southern reintroduction were statistically similar and highest among Field sport followed by Pro-raptor individuals ($M = 0.92$, $SD = 0.97$; 0.94 $SD = 1.27$) while Non-raptor and Pro-bird approval of this form of management centred around neutral ($M = 0.05$ $SD = 1.22$; $M = -0.01$, $SD = 1.26$).

3.5 | Impact of proposed action plan measures on hen harrier recovery in England

Views on how management activities would impact harrier recovery and grouse management in England varied between respondent groups (Figure 4). With the exception of monitoring, groups disagreed significantly on whether each management activity would increase harrier numbers (Figure 4a; Supporting Information Table S7). Of all management activities presented, Pro-raptor and Pro-bird respondents reported improving intelligence and nest and roost protection to be most likely to increase harrier numbers; post hoc tests revealed that these opinions differed significantly to Field sport and Non-raptor respondents. Field sport and Non-raptor individuals did not differ significantly in the degree to which they thought brood management was a useful tool for increasing harrier numbers; but their views differed significantly to the Pro-raptor and Pro-bird affiliates.

There was no significant difference in the degree to which respondents believed diversionary feeding would reduce the impact of harrier on grouse; means ranged from 0.72 ($SD = 1.01$, Field Sport) to 0.97 ($SD = 0.78$, General-bird) where two indicates strong agreement that diversionary feeding would reduce the impact of harrier (Figure 4b; Supporting Information Table S8). Field sport affiliates were significantly more likely than other groups to perceive brood management and a southern reintroduction as effective approaches to reducing the impact of harriers on grouse.

There were no significant differences in opinions reported by individuals from different affiliations and the effectiveness of monitoring, diversionary feeding, or improving intelligence at reducing disagreements between stakeholders; answers sat between neutral and agree (Figure 4c; Supporting Information Table S9). Compared to all groups, Field sport respondents were significantly more likely to report that brood management or a southern reintroduction would

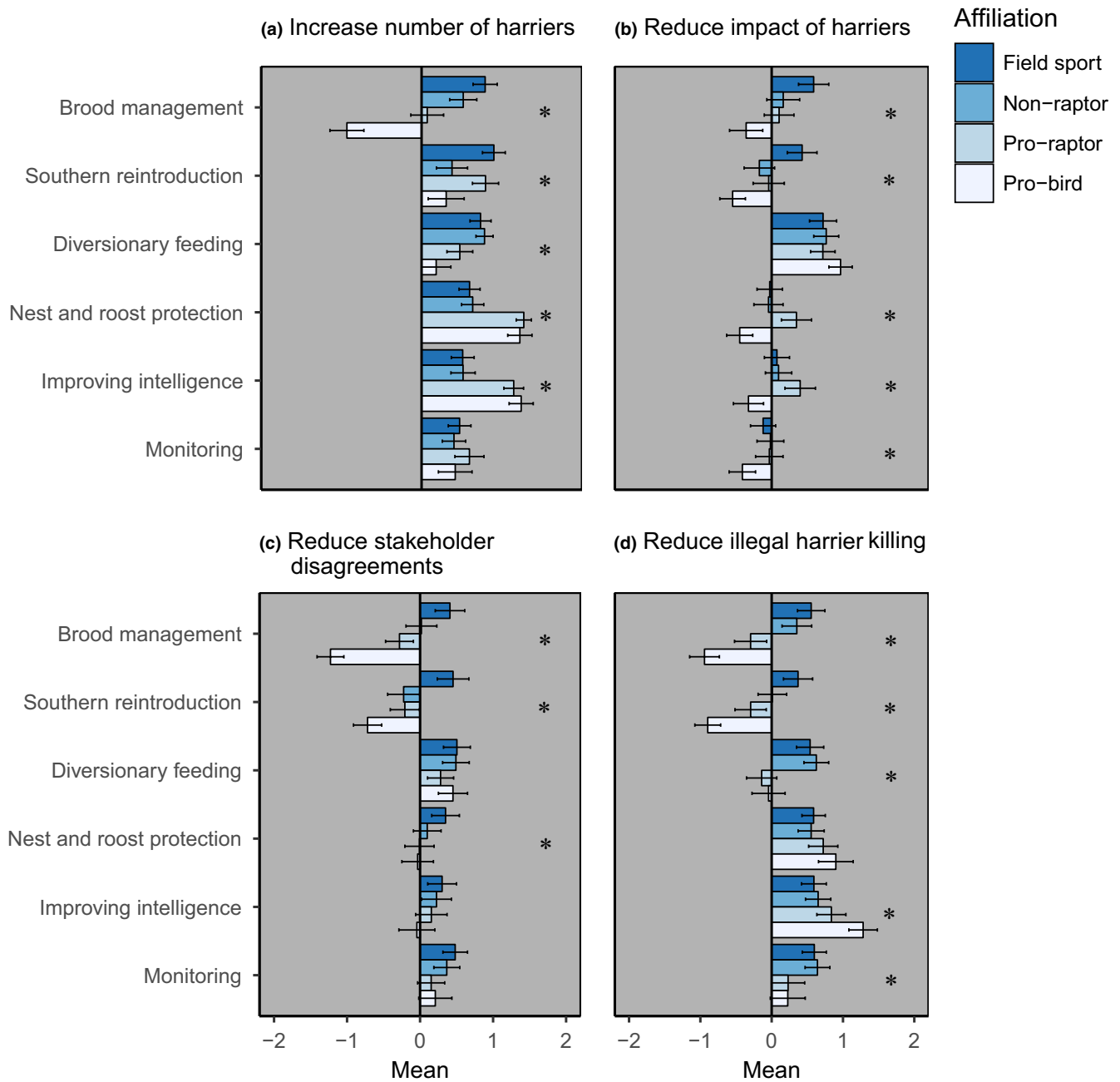


FIGURE 4 Mean level of belief that each management options would (a) increase the number of hen harriers, (b) reduce the impact of harriers on grouse, (c) reduce disagreements between stakeholders, and (d) reduce illegal killing of harriers. -2 indicates disagreement, 0 neither agreement or disagreement, and +2 indicates strong agreement. Data are grouped according to respondent affiliation: “Field sport” (i.e., hunting, shooting, fishing); “Non-raptor” (focusing on the protection of nonraptors); “Pro-raptor” (specializing in raptor protection); and “Pro-bird” (involved in nonraptor and raptor protection). Statistically significant differences are denoted by an asterisk. Error bars show 95% confidence interval

reduce stakeholder conflict. No other group held these opinions and Pro-bird respondents were significantly less likely than other groups to believe that a southern reintroduction or brood management would reduce disagreements.

While there were some significant differences in levels of agreement between groups, all respondents agreed that the illegal killing of harriers could be reduced through monitoring, nest and roost protection, and improving intelligence (Figure 4d; Supporting

Information Table S10). Field sports and Non-raptor groups believed that diversionsary feeding and brood management would reduce illegal killing, but these views differed significantly to respondents associated with Pro-raptor and Pro-bird organizations.

Trust in Natural England differed significantly across groups ($F(3,428) = 6.88, p \leq 0.001$). Post hoc tests revealed that Field sport and Pro-raptor respondents reported statistically similar answers with a mean value indicative of slight trust ($M = 0.30, SD = 1.11$;

$M = 0.35$, $SD = 0.35$; $p = 0.98$). Non-raptor and Pro-bird affiliates also reported statistically similar responses ($p = 1.0$) but with a mean value indicative of slight distrust in Natural England ($M = -0.10$, $SD = 0.93$; $M = -0.11$, $SD = 1.02$; $p = 1.0$).

4 | DISCUSSION

Our work highlights the very different value orientations held by stakeholders in this conflict. While the majority of respondents affiliated with field sport organizations reported utilitarian values, the majority of Pro-raptor and Pro-bird respondents were driven by mutualist beliefs. These value orientations were strongly associated with people's attitudes towards management. Those at the utilitarian end of the spectrum generally held attitudes supportive of grouse shooting and gamekeepers, in contrast to those on the mutualist side. As suggested by the cognitive hierarchy (Vaske & Manfredi, 2012) we also found strong correlations between attitude and support for management options, our proxy for behaviour. Those holding more positive attitudes towards harriers on English uplands and less positive attitudes towards grouse shooting and gamekeepers generally showed greater support for monitoring, nest protection, and increased intelligence. In contrast, those reporting more positive attitudes towards shooting or gamekeepers were more supportive of reintroduction and brood management. Our findings add to a growing body of research providing evidence that wildlife value orientations help explain patterns of human behaviour relating to wildlife (e.g., Fulton et al., 1996; Jacobs et al., 2014; Teel & Manfredi, 2010; Vaske & Donnelly, 1999). Furthermore, our work highlights the importance of fostering relational values, that is, values pertaining to all manner of relationships between people and nature, for proenvironmental protection (Chan et al., 2016).

Wildlife value orientations do change, but they do so slowly and it is unlikely that they change in response to specific interventions (Heberlein, 2012; Manfredi et al., 2017). Moreover, where attitudes are related strongly to underlying values, as they are here, they can also be difficult to change (Heberlein, 2012; Manfredi, 2008). However, the fact that values are deep-set and along with attitudes change slowly, does not mean that conflicts between parties cannot be reduced and managed. There is considerable proof that attitudes and behaviour are relatively unresponsive to evidence and knowledge (e.g., Ericsson & Heberlein, 2003; Heberlein & Ericsson, 2008). Thus, drives to change attitudes, and ultimately behaviour, through education programmes, are unlikely to be successful (Curti & Valdez, 2009; Espinosa & Jacobson, 2012). However, just as values are cultivated through repeated experience with peer groups (Chan et al., 2016), attitudes also change in relation to experience (Espinosa & Jacobson, 2012; Heberlein & Ericsson, 2008; Sponarski, Vaske, Bath, & Loeffler, 2016). This suggests that, in a conservation conflict, changes in entrenched positions are more likely to emerge through exposure to stakeholders with different beliefs, and to the system and interventions in question. Furthermore, successful management may depend upon identifying value similarity among stakeholders

and building upon shared values to support engagement and seek compromise, rather than highlighting differences (Manfredi, 2008).

With respect to the harrier-grouse conflict, there are commonalities in values among Field sport and Non-raptor affiliates yet there is limited overlap in the values held by these two groups and respondents associated with organizations whose primary objective is avian conservation. This represents a considerable challenge to re-establishing dialogue and it seems plausible that divergent values prevent meaningful dialogue between groups. However, as suggested in a recent analysis of conflicts around birds of prey in Scotland, shared narratives can offer a springboard to new exchanges between stakeholders (Hodgson et al., 2018). Consequently, there may be merit in expanding the dialogue beyond harriers and towards moorland management more broadly; this would widen the opportunity for identification of common narratives and goals. As is often the case where conservation conflicts revolve around enigmatic predators, the highly political and emotive nature of the harrier-grouse conflict means establishing a more expansive dialogue will be challenging. However, approaches such as transdisciplinarity and adaptive co-management, which are designed to build a shared experience around research, may offer a solution (Armitage et al., 2009; Klein et al., 2001).

Transdisciplinarity and adaptive comanagement link to the idea of conflict transformation, which concerns the exploration and acknowledgement of values and focus on deliberative responses and the building of trust and relationships (Madden & McQuinn, 2014). If parties are prepared to come to the table and deliberate then there is scope to manage problems to reduce conflict (e.g., Butler et al., 2015; Lundmark & Matti, 2015). The successful implementation of these deliberative processes requires consideration of trust, representativeness, acknowledgement of different knowledge spheres, dialogue to explore perspectives, and agreed goals and leadership (Davenport, Leahy, Anderson, & Jakes, 2007; Sjölander-Lindqvist, Johansson, & Sandström, 2015; Young et al., 2016). Such approaches do not change values or remove conflict, but they allow for exposure to different views and the potential development of compromise and solutions through deliberation.

Young et al. (2016) highlighted the importance of building and maintaining trust between stakeholders where conservation conflicts occur. Working in collaborative teams can help in this process (Stern, 2008). Similarly, trust in the agency responsible for management is critical (Beierle & Konisky, 2000; Sponarski, Vaske, Bath, & Musiani, 2014). Without trust, people are less likely to accept management interventions (Cvetkovich & Winter, 2003; Nyaupane, Graefe, & Burns, 2009). In this study, trust in Natural England differed significantly across groups and was generally weak; addressing this represents an opportunity and a significant challenge. Like many conservation conflicts, parties involved in the harrier-grouse conflict have high levels of ecological knowledge. Building trust between Natural England and such well-informed parties requires a willingness to integrate such knowledge into conservation policy and "a willingness to share power in terms of knowledge and policy implementation" (Young et al., 2016). Natural England strived to attain

this goal by establishing a multiparty board to codevelop the Action Plan (DEFRA, 2016). However, the process failed to overcome some of the differences between key parties. In contrast, parties appear to be becoming more polarized in this conflict. Encouraging such stakeholders to come back to the table will prove challenging, especially under the spotlight of aggressive social media campaigns.

In this study, we present evidence that each respondent group supported at least four of the six management approaches outlined in the Action Plan (DEFRA, 2016). Probird affiliates showed clear preference for less invasive management, and alongside Pro-raptor respondents did not support brood management. Support for a southern reintroduction was also limited. In contrast, Field sport individuals expressed a degree of support for all management types and showed no statistically significant preference for any of them. Levels of support for diversionary feeding did not differ significantly between groups but among Pro-raptor and Pro-bird respondents received significantly less support than monitoring, improving intelligence, or nest and roost protection. All groups considered that most management approaches outlined in the Action Plan (DEFRA, 2016) would increase the numbers of harriers in England. Our results indicate diversionary feeding was most favoured and received greatest consensus. All groups also considered that this approach had the potential to reduce the impact of harrier on grouse, but Pro-raptor and Pro-bird respondents did not consider that it would reduce the extent of illegal killing. Instead, all groups agreed that the illegal killing of harriers could be reduced through improved intelligence and nest and roost protection. However, it was over the issue of brood management where there was most disagreement. Pro-bird affiliates were strongly against brood management while supporters of field sports were in favour.

The DEFRA recently licensed a trial of brood management. As expected, this has proved highly controversial among some conservation organizations and is now subject to two judicial reviews (Harper, 2018). Should it go ahead, the trial will enable a test of whether or not brood management can reverse harrier declines in England and a chance to see if outcomes lead to changes in position regarding the technique. We suspect that such changes will be dependent upon the way the trial is implemented; if groups are excluded, they are less likely to move position.

As we have seen, new knowledge may not lead to a change in attitudes or the acceptance of brood management as a legitimate strategy. Indeed, in this fractured and polarized debate it is hard to see how any progress towards conflict management can develop without further investment in a strong, deliberative process that invests in building trust through a comanagement process that is supported by government. Any such process will require leadership on all sides, resources, time, and importantly a willingness to engage and seek compromises (Armitage et al., 2009). However, partly because of continued illegal killing (Melling, Thomas, Price, & Roos, 2018), it currently seems unlikely that key conservation organizations would be willing to come to the table, and will instead continue to pursue an adversarial focus on licensing or banning grouse shooting.

A number of studies have highlighted the importance of understanding stakeholder values in conflicts over wildlife management (e.g., Manfredo et al., 2004; Dickman 2010; Dietsch, Teel, & Manfredo, 2016; Lute, Navarrete, Nelson, & Gore, 2016). These have focused on the public or on one specific set of stakeholders. Our research has highlighted the relevance of considering the values held by divergent groups of stakeholders invested in a single conflict (see also Bredin, Lindhjem, Dijk, & Linnell, 2015). Such a focus emphasizes the critical difference between considering these issues as conflicts between people over the management of wildlife, as opposed to human-wildlife conflicts (Redpath et al., 2013). Ignoring the similarities and differences between the values held by different groups of stakeholders involved in conservation conflicts will hinder attempts to manage them.

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AUTHOR'S CONTRIBUTIONS

All authors contributed to conceptual design, or data acquisition, analysis and interpretation, writing or revising text, approved the submission and agree accountability.

DATA ACCESSIBILITY

Data are publicly available through Figshare using the following link: https://figshare.com/articles/StJohn_et_al_dataset_for_Value_diversity_and_conservation_conflict_Lessons_from_the_management_of_red_grouse_and_hen_harriers_in_England_People_Nature/7359209.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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