GAME MANAGERS' VIEWS ON THE RELEASE OF FARM-REARED RED- LEGGED PARTRIDGES IN HUNTING ESTATES WITHIN CENTRAL SPAIN

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ABSTRACT

The release of farm-reared animals for shooting causes frequent conflicts between hunters and conservationists, since, while this management practice is economically important in some game areas, it carries several risks for biodiversity conservation (e.g. the introduction of new pathogens or the release of alien species and/or hybrids). However, these conflicts have received little attention in the literature. In particular, social psychological factors, which are very important driving conservation conflicts, have been often ignored in the study of releases. Our main goal was to examine attitudes and beliefs of game managers towards the release of farm-reared red-legged partridges in small-game estates within central Spain, where more than 3 million partridges are released annually. Data were collected through face to face interviews with 45 game managers. More than 70% of the interviewed managers expressed negative views towards releases, and these included arguments about their detrimental effect on natural population, their low effectiveness, and their consideration as artificial hunting. Very negative views predominated among managers who had never released partridges (mostly those of non-commercial estates), and were frequently expressed by those who released partridges occasionally. In contrast, positive views were mostly given by managers who released partridges annually, and arguments used generally referred to the economic benefits of releases. Some managers expressed at the same time both positive and negative views on releases (i.e. ambivalent position). These findings suggest that there exists a relative polarisation among game managers, and that the position of those who were very critical of releases is

close to that of conservationists. Our results also suggest that managers' decision-making regarding releases is likely influenced by a variety of beliefs and attitudes as well as the socioeconomic setting (e.g. economic interest in the outcome of the behaviour). This highlights that the study of different aspects, including social and psychological as well as economic, is essential for understanding and resolving conservation conflicts, such as those caused by releases.

Keywords: *Alectoris rufa*; Attitude-behaviour relationship; Conservation conflicts; Interview survey; Managers' decision-making; Psychological factors

INTRODUCTION

All over the world, nature conservation is increasingly in conflict with human activities (Redpath et al. 2013). A human activity that sometimes comes into conflict with biodiversity conservation is hunting. Hunting and its associated management provide multiple benefits for society, such as food, recreation, employment, cultural identity, and also some positive ecological outputs for biodiversity conservation (Fischer et al. 2013a). However, there are situations on which positions of parties representing nature conservation interests clash with those of hunters. A well-known source of conflicts between hunters and conservationists is the management of predators; hunters usually control predators because they view them as competitors for the same resource (i.e. game species), whereas conservationists frequently believe that these predators deserve special protection (White et al. 2009). Other conflicts

involving these stakeholders have received much less attention in the literature, such as that caused by the release of farm-reared animals for shooting. While this management practice is economically important in some game areas (e.g. Diefenbach et al. 2000), it carries several risks for biodiversity conservation, such as the introduction of new pathogens from the farm to the field (Viggers et al. 1993; Cunningham 1996), or the release of alien species and/or hybrids, which in turn causes adverse genetic effects to wild populations (Laikre et al. 2010). Additionally, it is perceived by non-hunters as an artificial way of obtaining huntable game, and has thus connotations of illegitimacy and other negative attributes (Díaz et al. 2009).

The release of captive-bred animals to augment or maintain harvested populations has become an increasingly common management activity in many regions all over the world (Champagnon et al. 2012). In particular, game birds have been intensively bred and released in Europe and North America to supplement wild stocks (Sokos et al. 2008). In Spain, for example, the release of farm-bred red-legged partridges (*Alectoris rufa*) for shooting has substantially increased over recent decades following the decline of wild populations (Blanco-Aguilar et al. 2008); rough estimates have suggested that in Spain more than 3-4 million are released each year (Lucio & Purroy 1992; Vargas & Duarte 2002), but these numbers may be underestimated (Caro et al. 2014). This figure is lower than numbers of game birds released in the UK (e.g. 6.5 million red-legged partridges or 35 million pheasants (*Phasianus colchicus*) per year), but higher than that of mallards (*Anas platyrhynchos*) or red-legged partridges in France (1.4 million and 2 million per year respectively), (Arroyo & Beja 2002, Caro et al. 2014 and references cited therein), and much higher than that of any

other game bird released in Spain (e.g. 68000 quail (*Coturnix coturnix*) per year, Sanchez-Donoso et al. 2012, or 120000 pheasants per year, IEPNB 2014). The high number of partridges released is even more striking when put in context of official statistics indicating a maximum of 3.5 million partridges hunted annually all over Spain (MARM 2006), although reliability of these data has also been questioned (Garrido 2012). Massive partridge releases (i.e. >1000 partridges/km² released annually; Arroyo et al. 2012) occur in a few commercial estates (see material and methods for more information of these estates), allowing higher harvest (Díaz-Fernández et al. 2012), and greater revenues and profitability (Díaz-Fernández 2012). However, a great majority of estates release much lower quantities (on average < 15 partridges/ km² annually; Arroyo et al. 2012), but releases at this smaller scale do not have any clear positive effect on harvest as compared with estates where partridges are not released (Díaz-Fernández et al. 2012). In contrast, these small-scale releases seem to negatively affect wild stocks (Díaz-Fernández et al. 2013a), as probably also happens with massive releases. From a conservation point of view, the release of farm-bred partridges also poses a risk to wild populations because of introducing parasites (Villanúa et al. 2008) and enteropathogens (Díaz-Sánchez et al. 2012). Importantly, some of these introduced pathogens can be transmitted to sympatric species of conservation concern like the Little Bustard (*Tetrax tetrax*; Villanúa et al. 2007). In addition, the use for restocking purposes of *A. rufa* x *A. chukar* hybrids, which adapt better to captivity where they have better breeding performance than *A. rufa*, may be leading to the erosion of the gene pool of wild populations (Blanco-Aguilar et al. 2008; Barbanera et al. 2010; Casas et al. 2012).

Conservation conflicts cannot be fully understood from a single perspective, but require integration of conceptual approaches developed by several disciplines, including natural sciences, economic sciences, social sciences and humanities (White et al. 2009; Redpath et al. 2013). However, some of these disciplines are less often considered in studies addressing conservation conflicts than others, and only recently their critical importance has been fully recognised (e.g. Redpath et al. 2013). For example, despite evidence that social psychological factors can be very important driving conservation conflicts, they are often ignored (Dickman 2010). In this sense, only a few studies have investigated the attitudes of the stakeholders involved in conservation conflicts derived from hunting and its associated management, and most of them have dealt with the attitudes of hunters and/or non-hunters towards predators and/or their management (e.g. Marker et al. 2003; Treves & Martin 2011; Treves et al. 2013). Information regarding how hunters or game managers view other conflictive management activities, such as the release of farm-reared animals, is scarce to date (but see Delibes-Mateos et al. 2014).

Attitudes (favour or disfavour towards an object) are theorised to be one of the antecedents of behaviour (Ajzen 1991; Manfredo & Bright 2008), and are frequently founded on beliefs; generally speaking, we form beliefs about an object by associating it to certain attributes, characteristics or events (Ajzen 1991). For example, many game managers believe predators are extremely harmful for game, their attitude towards predators is frequently negative, and their usual reaction is to remove/kill them (Delibes-Mateos et al. 2013).

Conversely, it has also been argued that people adapt sometimes their attitudes post-hoc to their behaviour (Ajzen 1991; Manfredo & Bright 2008). For example,

managers who use intensive predator control because of economic interests may develop a more negative attitude towards predators to “match” their behaviour. Whether attitudes are antecedents of behaviour or vice versa, it is likely that game managers who use releases view this management practice differently than those who do not use such management. Assessing managers’ attitudes and beliefs about releases will help to improve our understanding of the factors influencing behaviourally relevant decision-making in game managers (i.e. to release or not). It has been recently shown that hunters seem to prefer wild partridges instead of released ones, as they are clearly willing to pay much more money for the former (Delibes-Mateos et al. 2014). Thus, it seems that what is really inducing partridge releases can be more on the side of managers than on that of hunters, which makes critical improving our knowledge about game managers’ motivations to release partridges. This might help to find ways for the resolution of this conservation conflict.

Our main goal was thus to examine attitudes and beliefs of game managers towards the release of farm-reared red-legged partridges in small-game estates within central Spain, and determine whether these varied between managers that employed partridge releases and those that did not use this management technique. In addition, beliefs and attitudes can be related to a multitude of background variables (Marchisi & Macdonald 2012), including, among others, age and gender, education, religion, knowledge or socioeconomic status or interests (e.g. Hazzah et al. 2009). Given that releases may have an influence on profitability in some commercial estates (see above), we also aimed to explore whether game managers’ attitudes or beliefs varied in function of their

economic motivation. We discuss our results in the context of this management conflict.

MATERIAL AND METHODS

Context and study area

The present study was carried out in central Spain, which constitutes a very good place to assess conservation conflicts caused by hunting and its associated management. On one hand, this is a very important region for conservation. In particular, farmland areas (which are currently the main habitat for red-legged partridge; Blanco-Aguilar et al. 2004) within central Spain hold some of the most important populations of steppe birds of conservation concern (e.g. Benítez-López et al. 2014), and the area is also home of a large community of protected predators, including carnivores and raptors (e.g. the Spanish imperial eagle, *Aquila adalberti*; González et al. 2008). On the other hand, central Spain is likely the main hunting area in the country both socially and economically. Red-legged partridges have traditionally reached their highest natural densities in this area (Blanco-Aguilar et al. 2004), where they are the most preferred gamebird species (Ríos-Saldaña 2010), although their populations have suffered marked declines during the last decades mostly due to agriculture intensification and overhunting (Blanco-Aguilar 2007). Annually, several hundred thousand hunters, originating from this region, other Spanish regions as well as from other countries, visit this region, where >80% of the territory is covered by hunting estates, mostly privately managed (Ríos-Saldaña 2010).

As mentioned above, releases of farm-reared partridges in central Spain are overall common, although intensities vary largely among areas and estates (with some estates releasing large numbers every year, others employing this management option only occasionally and at low numbers, and others never using it; Arroyo et al. 2012; Caro et al. 2014). Hunting estates in central Spain may be non-commercial, when the stated aim is leisure (i.e. to provide access to game to local hunters or a group of friends that rent the hunting rights for a time period), or commercial, where the stated aim is to obtain economic benefit from the hunting rights (see a more detailed explanation in Arroyo et al. 2012). In addition, Spanish hunting laws recognize the figure of “intensive estates”, a special type of commercial estate (Arroyo et al. 2012), where partridges can be legally released throughout the hunting season. In these estates harvest is based almost exclusively on these releases (Díaz-Fernández et al. 2012), and economic profit is much higher than in other commercial estates (Díaz-Fernández 2012). Intensity of releases is much higher in commercial intensive estates (on average, 2142 ± 1972 partridges released per km^2 annually in 8 studied states) than in commercial non-intensive estates (16 ± 34 partridges released per km^2 annually, $n = 37$ estates), and in these than in non-commercial estates (2 ± 6 partridges released per km^2 annually, $n = 14$; Arroyo et al. 2012). Similar differences in the intensity of management between the three types of estates have been also observed for other management variables like predator control or the use of supplementary feeders (Arroyo et al., 2012). This categorisation (non-commercial, commercial and intensive estates) helped us to operationalize the economic motivation of each manager for analysis (see below).

To release partridges, game estates have to: 1) declare their intention of using this technique in a 5 year management plan that each estate has to present to the administration (see more details of these plans in Ríos-Saldaña et al. 2013); and 2) apply for a special permit every year declaring that the manager wants to release partridges (Caro et al. 2014). According to current law, hunting estates that release partridges have to do so before the general hunting season (October-February), with the exception of intensive estates, as stated above. In this sense, those estates that aim to be administratively labelled as “intensive” have to apply for such special certification. In non-intensive estates, managers usually release partridges as closely as possible to the start of the hunting season (Díaz-Fernández 2012), probably trying to ensure that partridges are available when hunting starts, because released partridges usually suffer a high mortality rate in the first weeks after release (Alonso et al. 2005). There is compelling evidence indicating that selling released birds as if they were wild partridges may be a common practice in our study area (see Díaz-Fernández et al. 2013b), most likely due to hunters’ preference for wild partridges (Delibes-Mateos et al. 2014), their higher price and the poor current status of their populations (Delibes 1992; Garrido 2012; Díaz-Fernández et al. 2013a). This fraudulent activity is favoured by the fact that, according to the legislation, farm-reared partridges do not have to be marked (e.g. ringed) before being released.

Data collection and analysis

This study derived from a wider project that assessed different aspects regarding game management in >50 hunting estates within central Spain (Arroyo et al. 2012; Díaz-Fernández et al. 2012, 2013a; Delibes-Mateos et al.

2103). Overall, we surveyed a wide variety of estates, from unmanaged to very intensively managed (see Arroyo et al. 2012). Data were collected through face to face semi-structured interviews with game managers conducted between 2005 and 2009. Game managers here referred to those people in charge of game management in each hunting estate. These could be landowners, gamekeepers and/or presidents of hunting associations. We contacted key members of two hunting associations with large influence in the study area and hunters who had previously collaborated with our institute, and these people provided contact information of potential future participants in our interviews (i.e. a snowball procedure; Oñate & Peco 2005; Schüttler et al. 2011) (see more details in Delibes-Mateos et al. 2013). We specifically asked our informants for game managers of intensive estates, given that they are currently less common in the study area; currently, only 3% of the game estates in central Spain are intensive estates (Ríos-Saldaña 2010).

Here, we specifically evaluate data from 45 hunting estates out of the total estates surveyed, whose managers had provided information on their views towards releases. The open question on opinion about releases (see below) was not specifically stated to the remainder. There were, in principle, no systematic differences between those who provided this information and those who did not. Thus, both included commercial and non-commercial game estates, varying in the intensity of management. In addition, both groups of managers (i.e. those who provided information about releases and those who did not) expressed during the interviews their views on other management activities like predator control (Delibes-Mateos et al. 2013), suggesting that their willingness to share information was similar.

The interviews were conducted by the same person (Silvia Díaz-Fernández), who provided anonymity and confidentiality to managers, as releases may be viewed as a controversial issue. The interviews were conducted in an informal, conversational manner (Kvale 1996), and combined closed questions and the flexibility of more open questions targeted at capturing the game managers' perceptions (see an example of this approach in Oñate & Peco 2005). The interviews included questions on the general characteristics of the hunting estate and other management practices, which were part of other studies (Arroyo et al. 2012; Delibes-Mateos et al. 2013). Regarding the release of farm-reared partridges, we specifically asked whether this management practice was carried out on the hunting estate, whether partridges were released every year during the last ten years before the interview (annual releases) or had only been released sporadically (occasional releases). This helped us to assess managers' behaviour in relation to releases. In addition, we inquired game managers about their opinion on releasing farm-reared partridges. This was an open question, and therefore several different answers were obtained. Sometimes answers included attributes that managers used to describe this practice, which helped us to identify attitudes towards it (Selge et al. 2011). On other occasions, what was expressed were beliefs (expressions of likelihood that releases would produce a certain outcome). Despite the conceptual distinction between attitudes and beliefs (Ajzen 1991), empirically, we could not always draw the line or the relationships between these two because not all respondents expressed both. Therefore, we use "views" to refer to both attitudes and beliefs.

We grouped replies in categories, revised them step by step and reduced them to main categories (inductive category development, Mayring 2000; see also an example in Schüttler et al. 2011). These categories were based on whether the views on releases were clearly positive, clearly negative, ambivalent (i.e. when the respondent specified that they were positive in certain circumstances, but negative in others) or neutral (i.e. comments on releases that were neither positive nor negative); and on whether the arguments used to illustrate or defend that view were ecological, functional, economic or moral (Fig. 1). We describe the main categories that arise, and compare frequencies of replies related to each of our categories among managers who used this technique annually, occasionally, or never; and among those of intensive estates, commercial non-intensive estates and non-commercial estates (i.e. in relation to the economic motivation of each manager).

RESULTS

Releases of farm-reared partridges occurred in 20 (44%) of the studied estates; partridges were released annually in 11 of these estates and occasionally in 9. A variety of views were offered in relation to releases. A summary of these views is shown in Figure 1. In general, expressions that were related to the ecological implications of releases were negative, those associated with the economic aspects of releases were mostly positive, and comments related to functional or moral aspects of releases were more varied, although never extremely positive.

In quantitative terms, about half of the interviewed managers expressed only negative views towards the release of farm-reared partridges, whereas only two

of them expressed exclusively positive views on this management tool (Table 1). In addition, a few managers who expressed negative opinions about releases provided at the same time positive arguments on this management option (i.e. ambivalent views; Table 1); for example, *“It is impossible to preserve wild populations if you release farm-reared partridges, but releases are essential if you desire making use of hunting commercially”* (Game manager 22, commercial non-intensive estate, releases: never). Neutral comments towards releases that did not include any clear evaluation were made by some managers (*“when I released partridges, about half of the birds died, but the ones that survived were well adapted”*; Game manager 10, commercial non-intensive estate, releases: occasional). Others qualified their evaluation, saying, for example *“doing it properly, releases may work”* (Game manager 15, commercial intensive estate, releases: annually).

Negative views towards the release of farm-reared partridges dominated among managers who had never employed this management option; these managers only occasionally expressed ambivalent or neutral opinions about releases, and never used positive arguments about these (Table 1). Interestingly, negative arguments were also expressed among managers who released partridges (and even dominated among those managers who released only occasionally), although, logically, positive and neutral views were more common in this group (particularly in managers who released partridges annually). Similar trends were also found when comparing non-commercial, commercial and intensive estates (Table 1).

64% of the managers who expressed negative views on the release of farm-reared partridges (n=33) used ecological arguments against those releases

(Table 2). Among these dominated the belief that releasing farm-reared partridges damaged native birds, either because the former introduced new parasites or diseases (this was the argument most frequently given) or because they hybridized with the latter. Almost all managers who considered that releases detrimentally affected wild partridges had never carried out this management activity (81%; n=16). None of the managers who released partridges annually mentioned whether releases damaged wild populations or not. In relation to the ecological arguments, it was also occasionally mentioned that released partridges attracted predators, which was viewed as negative for the wild stock. This argument was similarly expressed by managers who had (60%, n=5) or not (40%, n=5) released partridges. Interestingly, this was the only ecological argument given by those managers of intensive estates who expressed negative views on releases (33%; n= 3).

Negative comments regarding the effectiveness of releases were also frequently given (Table 2). 58% (n=12) of the managers who provided this argument had released farm-reared partridges; most of these (86%; n=7) had done it only occasionally. Some of these managers explicitly declared that they had experienced in the past that releases did not work to increase partridge numbers; therefore, they disliked this management option and expressed their intention of not using it again in the future. In addition, a third of the participants in our study made moral assessments about shooting farm-reared partridges, which was referred to as "*artificial hunting*" (Table 2). Almost all of the managers that mentioned this idea had never used this management activity (91%; n=11). Finally, 3 managers were against the release of farm-reared partridges, although they did not specify their arguments.

Most of the positive views towards releases referred to their economic benefits (60%; n=10). *“Economically, releases work really well”* (Game manager 45, commercial intensive estate, releases: occasional), *“they are a business that provide money”* (Game manager 13, commercial non-intensive estate, releases: annually), *“releases are essential for commercial hunting”* (Game manager 18, commercial intensive estate, releases: annually) were some of the statements made by our participants. This argument was equally frequently given by managers who had or not released partridges (15 and 12%; n=20 and 25, respectively), or in relation to the economic profitability of the estates (12 and 15% in commercial and non-commercial estates, respectively; n=32 and n=13, respectively), although the percentage was higher when looking only at the managers of intensive estates (25%; n=8). It was also mentioned that the release of farm-reared partridges could bring benefits for ecosystem overall. For example, a manager quoted: *“it is a necessary evil to preserve the ecosystems; otherwise this estate, which is a game estate since seven centuries ago, would have been transformed into a golf course, for example”* (Game manager 16, commercial intensive estate, releases: annually). However, this opinion was less frequently given than the economic arguments (20%; n=10). Other positive assessments about releases were occasionally given (20%; n=10). For example, one manager quoted: *“it is completely different shooting wild partridges than farm-reared ones, but the latter is also enjoyable”* (Game manager 20, commercial non-intensive estate, releases: never).

DISCUSSION

To the best of our knowledge, this is the first assessment of the complex relationships between game managers' perceptions about the release of captive-reared animals for shooting and their own releasing behaviour. Our results suggest that managers' decision-making regarding releases is likely influenced by a variety of beliefs and attitudes as well as the socioeconomic setting (e.g. economic interest in the outcome of the behaviour). This is in agreement with previous studies on social and psychological factors affecting managers' decision-making about wildlife management (Marchini & Macdonald 2012). Overall, our results suggest that there exists a relative polarisation among game managers, with a division between those who were very critical of this practice, and those who were more ambiguous or even positive. This situation contrasts with the fact that nearly all managers within the same study area expressed clearly positive views towards other game management practices, such as predator control (Delibes-Mateos et al. 2013).

Some managers pejoratively referred to releases as artificial hunting, which indeed is often criticized by both hunters and non-hunters in several countries within Europe and Africa (Fischer et al. 2013b). Nevertheless, the most frequently expressed negative opinions towards this practice referred to ecological aspects. Interestingly, their arguments, such as released birds may spread parasites and diseases, are supported by scientific knowledge (Blanco-Aguilar et al. 2008; Villanúa et al. 2008; Díaz-Sánchez et al. 2012; Díaz-Fernández et al. 2013a), unlike in the study of the views of managers within the study area on predators. In the latter case, managers mostly declared that predators drastically reduced partridge numbers, although some scientific studies have questioned this perception (e.g. Casas & Viñuela 2010; Blanco-

Aguiar et al. 2012; Díaz-Fernández et al. 2013a). This discrepancy may be explained because the potential effect of predators on Spanish partridge population is still unclear (see references above, but also Moleón et al. 2008, 2013), while the detrimental effects of partridge releases on wild populations are more consistent in scientific studies. In addition, it is also likely that the traditional prejudice among hunters towards predators (Lindsey et al. 2005) does not exist in the case of releases, and that scientific knowledge regarding releases may have been successfully transferred to hunters, which does not always occur with environmental science (Groffman et al. 2010). Whilst the former has not been assessed yet, the fact that some scientific studies about the effect of releases on wild partridge populations have been funded by hunting associations (e.g. FEDENCA 2012) may have facilitated the transferability of the results to the community of hunters/managers. Most of the positive views about releases were related to the perceived economic benefits associated with this management tool. Particularly relevant were the comments expressing the belief that commercial hunting would be impossible without releases. This may explain why releases are more common in commercial than non commercial hunting estates (Arroyo et al. 2012), although preliminary analyses have shown that small-scale releases are not clearly associated with higher revenues and profitability (Díaz-Fernández 2012). Additionally, it was interesting to note that sometimes managers who participated in our survey expected contrasting outcomes associated with partridge releases. Thus, some of them expressed simultaneously that releases were essential to maintain commercial hunting (outcome 1), but that releases caused detrimental effects on wild partridges (outcome 2). This seems to imply

a belief that commercial hunting has become an artificial activity based on released partridges, but we could not explore this issue in this study. Further studies are required to specifically investigate how these managers deal with such contrasting beliefs, and how this influences their releasing intention and behaviour (see also Hrubec et al. 2001).

The social psychological theory most often used to explain environmental behaviour is the Theory of Planned Behaviour (Ajzen 1991). It states that the most proximal determinant of a person's behaviour is his/her intention to engage in that behaviour, which, in turn, depends on, among other factors, attitudes and beliefs leading to these (Ajzen 1991; but see also Manfredo & Bright 2008). In other words, behaviour is seen as informed by attitudes and beliefs. For example, attitudes towards killing jaguars (*Phantera onca*) predicts landowners' intention to kill them in both Amazonia and Pantanal, Brasil (Marchini & Macdonald 2012). In agreement with this, we found that the views towards releasing farm-reared partridges of almost all managers who had never released were negative, so their decision of not using this management tool may be determined by their attitudes. However, attitude is often a necessary but not sufficient condition for behaviour, and therefore attitudes and behaviour are not always tied (Ajzen 1991; Heberlein 2012). In this sense, we also noticed that managers who released farm-reared partridges (including those who released annually) did not always report firm, supportive discourses towards releases. It is possible that, in this case, the decision to release may be also influenced by factors not evaluated in this study, like social pressure by neighbours or hunting market, or the perceived incapacity to carry out other management actions to promote partridges.

Past behaviour can have a notable influence on future behaviour (Ouellette & Wood 1998). For example, past behaviour is usually a better predictor of food choice behaviour than psychological factors like attitudes (Köster 2009). In addition, it may also affect people's perceptions and motivations. For example, past experiences may affect one person's perceived ease or difficulty of performing the behaviour, which in turn is one of the antecedents of behaviour according to the Theory of Planned Behaviour (Ajzen 1991). In our study, some managers explicitly declared that they had no intention of releasing partridges in the future because they had experienced in the past that this did not work to increase partridge abundance/bags. Releases can be performed with or without conditioning and acclimation (soft and hard releases, respectively), and this may influence the survival of released birds. From this perspective, it would have been interesting to assess whether game managers' views on releases varied between those who carried out soft releases and those who used hard releases. However, unfortunately, we did not question in the interviews how partridges were released. In addition, positive assessments about the economic value of releases may have been formed through past observations of game managers of commercial intensive estates, who may have satisfactorily experienced that massive releases constitute a profitable business (Díaz-Fernández 2012).

Background factors can be related to or influence beliefs, attitudes and behaviour (Marchini & Macdonald 2012). In south-western China, for example, there was a relationship between people's attitudes towards Asiatic black bear (*Ursus thibetanus*) and their economic loss from bear due to its damage to crops or livestock (Li et al. 2011). In our study, managers of commercial estates

expressed ambivalent or non-negative (neutral or positive) opinions towards releases more frequently than managers of non commercial estates. This was particularly marked for managers of intensive estates, whose revenues associated with releases were greater than those of managers of non-intensive estates (Díaz-Fernández 2012). This is in agreement with the views of managers within the same study area on predators, since those with important economic interests showed more negativity towards predators than those with other interests (e.g. recreation; Delibes-Mateos et al. 2013). The attitudes of managers, shaped by their economic motivation, thus correlate relatively well with their behaviour: the more negativity towards predators, the more predators controlled (Delibes-Mateos et al. 2013), and the more positivity towards releases, the more partridges released for shooting (this study). Nevertheless, we found a few managers of intensive estates giving negative comments on releases, which suggests that they take into account at least some of the negative ecological outcomes this management technique may cause, but still use it just for economic interest. Again, this reveals the complex relationship between behaviour and its antecedents (Manfredo & Bright 2008; Heberlein 2012; Delibes-Mateos 2014).

Conclusions and management implications

Our results suggest that there might be more overlapping between the views on releases of most game managers and hunting critics than popularly assumed (Fischer et al. 2013b), and that their willingness to consider a negotiated agreement, which is a crucial factor in conflict management (Redpath et al. 2013), would be high. Our findings also support the idea that there is an internal

conflict regarding releases within the group of game managers, as some of them are entirely against this practice because of its detrimental effect on wild partridge populations, while others do not view it as problematic, and use it for economic interests. Thus, rather than a confrontation between hunters and conservationists, this conflict involves managers who actively endorse releases (such as those of intensive estates, and some of non-intensive ones), and people opposed to this practice, including hunters/managers and conservationists. Seeking a mutually acceptable solution does not seem easy in this case as the priorities of both groups are fundamentally different. Given that currently it is very easy carrying out releases, including massive ones (permits are easily granted, and no additional charges are requested to intensive estates), game managers of estates using releases seem to be effectively winning. The opposite option would be banning releases, which has been proposed at least under some circumstances (Caro et al. 2014). However, massive releases constitute a profitable business not only for these managers (Díaz-Fernández 2012), but also for the owners of farms where partridges are reared, and therefore both stakeholders would not accept this solution. Although owners of intensive estates or of partridge farms are only a small portion of the Spanish hunting community, it seems that they have large influence in the institutions responsible for policy (i.e. regional or national governments, etc). In addition, our results also suggest that other managers, even some who do not use releases, might oppose the prohibition of this management practice, as they acknowledge its importance for the economy of rural areas. Therefore, currently banning releases does not seem to be a realistic option; in fact, in the only Spanish regional government where releases

have been banned since 1993 (Comunidad Foral de Navarra; northern Spain, there is currently strong pressure to change this regulation (E. Castién, pers. comm).

Alternatively, there have been attempts of creating a “Game Quality” label to promote the profitability of ecologically-favourable game management in Spain (Carranza & Vargas 2007), and this would likely allow hunters to identify estates that, among other things, do not release farm-reared partridges. This, together with the implementation of a mandatory tagging system for released partridges, something currently missing, would allow a clear identification of the quality of the product (i.e. the partridge). Recently, it has been shown that most hunters may agree with a system like this (Delibes-Mateos et al. 2014). Interestingly, the present study suggests for the first time that most managers, who ultimately make decisions regarding releases, might also accept this solution.

Overall, this study suggests that a broad approach for understanding and preventing the release of farm-reared partridges is needed. Such approach should go beyond the usual framework for discussing the conflicts associated with releases, and include discussion about the different motivations (social and psychological as well as economic) concerning this management practice. This study reveals the importance of game managers’ beliefs and attitudes in releasing farm-reared partridges, and highlights that the role of these aspects in managers’ decision-making regarding releases should be studied in depth. In this sense, it would be interesting to explore quantitatively the role of managers’ perceptions, subjective norms, attitudes and intentions in determining their releasing behaviour under the framework of the Theory of Planned Behaviour.

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FIGURE CAPTIONS

Figure 1. Summary of opinions expressed by game managers about releases of red-legged partridges as a management technique. These are arranged in relation to whether the views implied with those opinions are negative or positive, and whether the arguments were moral, functional, ecological or economic.

Table 1. Percentage of interviewed managers (number in “n”) who expressed negative, positive, ambivalent (i.e. managers who provided both positive and negative arguments about releases) or neutral (i.e. comments on releases that were neither positive nor negative) views towards the release of farm-reared partridges for shooting. Data is also shown separately for managers who released partridges (both occasionally and annually), and those who did not, and for managers of intensive estates, commercial non-intensive estates and non-commercial estates. Results are presented without decimal places, given the low sampling size.

	Views				n
	Negative	Positive	Ambivalent	Neutral	
All managers	53%	4%	18%	24%	45
a) Managers who had never released partridges	72%	0%	20%	8%	25
b) Managers who released partridges	30%	10%	15%	45%	20
+ Managers who released partridges occasionally	56%	0%	11%	33%	9
+ Managers who released partridges annually	9%	18%	18%	55%	11

1) Managers from commercial intensive estates	12%	12%	25%	50%	8
2) Managers from commercial non-intensive estates	58%	0%	17%	25%	24
3) Managers from non-commercial estates	69%	8%	15%	8%	13

Table 2. Percentage of game managers who expressed different negative views on the release of farm-reared partridges (n=33). Examples of quotes supporting each argument are shown. Results are presented without decimal places, given the low sampling size.

		Example quotes
1. Ecological arguments	64%	
1.1 Effect on wild populations	48%	It is important to preserve wild populations and don't release shit (Game manager 41, non-commercial estate, releases: never)
		They are the beginning of all the problems, the cause of extinction of wild partridges in Spain (Game manager 24, commercial non-intensive estate, releases: never)
a) Introduction of parasites and diseases	27%	I am against releases because farm-reared partridges spread diseases and hybridize with wild partridges (Game manager 27, commercial non-intensive estate, releases: never)
b) Genetic hybridization	12%	
1.2 Attraction of predators	15%	When you release farm-reared partridges the population

		of red foxes increases (Game manager 2, commercial non-intensive estate, releases: occasional)
2. Moral arguments (i.e. Artificial hunting)	33%	Releases are simply non-natural (Game manager 26, non-commercial estate, releases: never)
		Releasing farm-reared partridges is far from the essence of traditional, recreational hunting (Game manager 32, non-commercial estate, releases: never)
3. Functional arguments (i.e. low effectiveness of releases)	36%	Predators killed all the farm-reared partridges we released some years ago (Game manager 3, commercial non-intensive estate, releases: occasional)
		Their survival is very low, so ecologically releases can't be good (Game manager 45, commercial intensive estate, releases: occasional)