



## 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 partridge populations, 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.

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### 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 (Delibes-Mateos 2015). 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

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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 (Lucion & 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. 68,000 quail (*Coturnix coturnix*) per year, Sanchez-Donoso et al. 2012, or 120,000 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/km<sup>2</sup> released annually; Arroyo et al. 2012) occur in a few commercial estates (see Material and methods section 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/km<sup>2</sup> 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* × *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 drivers of 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 (Azjen 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 (Azjen 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 (Azjen 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 (Marchini and 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 terms 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). This area is also home to 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

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