

REPORT

Rumours about wildlife pest introductions: European rabbits in Spain

Miguel Delibes-Mateos

Received: 17 March 2016/Revised: 29 June 2016/Accepted: 23 August 2016/Published online: 9 September 2016

Abstract Rumours associated with wildlife are frequent, although they have received little attention in the scientific literature. Studying rumours is important because of their relevance not only in a broad theoretical sense but also in environmental management. The goal of this study is to explore the complexity of the relationships between humans and wildlife through a thematic analysis of rumours associated with allegedly introduced European rabbits (*Oryctolagus cuniculus*) that cause crop damage in Spain. For this purpose, potential rumours were identified using the Google search engine. Data analysis consisted of reading and re-reading Web-based texts to identify main themes, ideas and topics with the assistance of NVivo 10 software. The analysis identified three main themes: (1) the reviewed websites referred to allegedly introduced rabbits which differed from native rabbits; (2) differences were based on alleged observations of unnatural behaviour, physiology or physical appearance of introduced rabbits; (3) rumours were frequently used in the context of the rabbit management conflict; e.g. farmers accused hunters of releasing harmful rabbits. This study suggests that the analysis of wildlife-release rumours sheds light on the position of parties involved in conflicts associated with the (alleged) introduction of wildlife species. It stresses the importance of rumours in conservation and environmental management, and opens the door to future research.

Keywords Conflict · Farming · Human dimension of wildlife · Hunting · Pest species · Thematic analysis

INTRODUCTION

There exist numerous and varied myths, legends and rumours associated with wildlife (e.g. Dendle 2006; Radford et al. 2006; Alvares et al. 2011). They all form an

important part of the relationship between humans and wildlife (Herda-Rapp and Goedeke 2005). A rumour is the emergence and circulation of a collective interpretation of a problematic event that official sources deny or have not yet confirmed (Kapferer 1990). Rumours, therefore, are not necessarily false, but may be as yet unverified. Regarding wildlife, a classical rumour refers to the release of undesirable species in areas where they were previously absent (Campion-Vincent 1990a). For example, some people believe wolves (*Canis lupus*) have been secretly reintroduced in the Iberian Peninsula, France and Norway (Campion-Vincent 2005; Skogen et al. 2008; Alvares et al. 2011). Similarly, pine martens (*Martes martes*) were clandestinely introduced on the Isle of Mule in the Inner Hebrides according to a persistent local rumour (Solow et al. 2013). Many New Yorkers were convinced that alligators were released into and inhabited the city's sewers (Morgan and Tucker 1984). In southern Europe, there is a widespread conviction that helicopters drop boxes containing red foxes (*Vulpes vulpes*), vipers and/or small mammals (Campion-Vincent 1990b; Bruno and Maugeri 1992; Viñuela et al. 2010). Similarly, there are rumours about introductions of wild species, such as foxes, mon-gooses, rabbits, deer or fish in Australia and New Zealand (Low 2003; Peacock and Abbot 2010; Sarre et al. 2012; Blackman et al. 2013).

People tend to repeat a rumour and contribute to its transmission, particularly because it reinforces pre-existing opinions and interpretations (Skogen et al. 2008). This is one of the reasons why rumours may become common and/or widespread, as in the case of wolves, for example. Following the pioneering study of Allport and Postman (1947), the social sciences began to take rumours seriously, including those associated with wildlife introductions (e.g. Campion-Vincent 1990a, 2005; Skogen et al. 2008;

Ceriaco 2012). However, these have been largely overlooked by other disciplines such as conservation biology.

In general, the main protagonists in these accounts are negatively perceived species (Campion-Vincent 2005), because they have, or are believed to have, an impact on human property, livelihood and welfare. For example, wolves, including those allegedly reintroduced, kill livestock and big game (Sidorovich et al. 2003), and so farmers and hunters frequently claim that the presence of this predator reduces their quality of life (Skogen et al. 2008). A similar story occurs with small mammals, as they often damage crops (Singleton et al. 2003), or snakes, which typically suffer from a negative image and provoke fear (Ceriaco 2012).

Rumours often present a negative interpretation of events considered to be problematic. Rumours tend to attribute what actually or reportedly happened to persons or collective agents in such a way that these people are discredited or dishonoured (Kapferer 1990). For example, wolf opponents usually accuse conservationists and environmental agencies of secretly releasing wolves (Campion-Vincent 2005; Skogen et al. 2008). By incriminating other parties in the release of undesirable wildlife, opponents to such species reinforce their position; i.e. these species are non-native and should be eradicated. Rumours may create further tension between stakeholders with opposing interests when used to accuse other parties of releasing wildlife pests.

Conflicts regarding wildlife management have increased notably over the last few decades as a result of growing pressure on natural resources and concomitant demands for greater conservation by certain groups (Redpath et al. 2013). Such conflicts emerge when one of the parties aims to boost the numbers of a particular wild species because it is endangered, emblematic and/or a game species, but this species affects the interests of other stakeholders, such as farmers (Fig. 1; see also Delibes-Mateos 2015). These conflicts often pit one of the parties against wildlife (Treves and Karanth 2003), undermining its effective conservation (Redpath et al. 2013). For example, management actions to reduce the number of grizzly bear (*Ursus arctos*) and increase the populations of ungulates available for hunters seem to be jeopardising portions of the largest and most intact population of grizzly bear in North America (Miller et al. 2011).

The European wild rabbit (*Oryctolagus cuniculus*) is one of the main small game species in southern Europe; ~6 million rabbits are killed annually in Spain (MAGRAMA 2015). Hunters not only kill rabbits but also manage their populations to boost numbers, and thus increase game availability (Delibes-Mateos et al. 2008a). Rabbits can cause notable crop damage in some farmland areas (Ríos-Saldaña et al. 2013). As a consequence, farmers' goals in these areas include reducing rabbit numbers. Rabbits are also the main prey for several

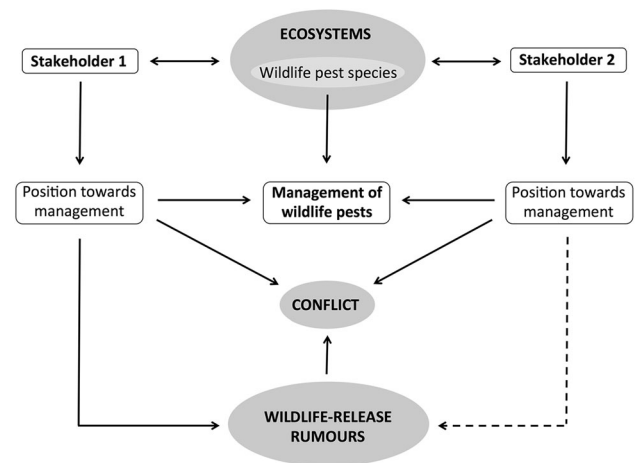


Fig. 1 Conceptual diagram showing the central role of wildlife-release rumours in links between humans and ecosystems, and particularly wildlife. Different stakeholders may construct vastly different definitions of the same wildlife pest species, which leads to their different positions concerning the management of such species. These competing views of wildlife and its management are at the core of social conflicts between stakeholders. Wildlife-release rumours are mostly used by those whose interests are potentially damaged by wildlife (*solid line*) to communicate the importance of their efforts to their own collective and to other parties, as well as to legitimise their involvement in wildlife pest management. The other party, which typically is pro-wildlife, spreads rumours much more rarely (*dashed line*). Wildlife-release rumours are usually accusatory tales and thus play an important role in wildlife management conflicts

endangered predators (Delibes-Mateos et al. 2008b), and therefore, conservationists aim to increase the rabbit numbers to improve feeding conditions for such predators. This complex situation frequently leads to conflicts between conservationists, farmers and hunters regarding the management of rabbits (Delibes-Mateos et al. 2014a). In this context, there is a popular belief that rabbits have been introduced in some Spanish farmland areas, leading to population growth and subsequent crop damage (López 2013). In fact, farmers often consider that allegedly introduced rabbits are responsible for damage attributed to the species.

The human dimension in conflicts over wildlife management has received much less attention in the scientific literature than the adverse wildlife impact that causes them (Peterson et al. 2010; Redpath et al. 2015). This is particularly evident in the case of rumours, which are traditionally and most typically derived from accounts in books, magazines and newspapers (e.g. Alvares 1999; Campion-Vincent 2005; Zaldivar 2006). The goal of this study is to explore the complexity of the relationships between humans and wildlife through a thematic analysis of rumours. This paper investigates rumours associated with allegedly introduced rabbits that cause crop damage in Spain, placing special emphasis on the role of rumours in the rabbit management conflict.

MATERIALS AND METHODS

Study species and context

The European rabbit is native to the Iberian Peninsula (Ferrand 2008), where it is present in most regions (Palomo et al. 2007), and historically reached very high densities. However, rabbit populations dramatically decreased during the second half of the twentieth century, mainly as a consequence of habitat loss and the effect of viral diseases (Delibes-Mateos et al. 2009). Consequently, rabbits were classified as “near threatened” and “vulnerable” in the Portuguese and Spanish Red Lists, respectively (Cabral et al. 2005; Villafuerte and Delibes-Mateos 2008). More recently, rabbit decline has been exacerbated with the outbreak of a new variant of rabbit haemorrhagic disease virus, which has caused high mortalities across Spain and Portugal (Delibes-Mateos et al. 2014b). Rabbit decline led hunters and conservationists to employ an increasingly diverse array of management measures to boost rabbit numbers, including rabbit restocking; this usually consists of translocating rabbits from donor populations to depopulated areas (Delibes-Mateos et al. 2008c).

In this setting of widespread rabbit decline, some populations have exhibited substantial growth in recent years (Delibes-Mateos et al. 2014a). These populations are generally outside historically high-density areas and are associated with agriculture (Barrio et al. 2010). In these areas, farmers, who are not usually accustomed to such high rabbit densities, increasingly report damage to crops (Ríos-Saldaña et al. 2013). According to Spanish legislation, holders of hunting rights are liable for damage to crops caused by game species, including rabbits (more details in Ríos-Saldaña et al. 2013). This means that hunters have to control rabbits actively to avoid paying compensation to farmers for the damage caused by the species (Delibes-Mateos et al. 2014a). On the contrary, hunters are not liable for damage caused by wildlife species that are not listed as game, such as recently introduced species (Alda et al. 2013).

Data collection and analysis

My preconception was that rumours about rabbit introductions were associated with damage attributed to this species, as allegedly introduced wildlife are usually believed to be responsible for harming human interests (Skogen et al. 2008). Therefore, I identified potential cases of rabbit damage in Spain using the Google search engine (www.google.es) and the search terms “pest” and “rabbit” (in Spanish: “plaga” and “conejo”, respectively). I visited the first 600 websites and carefully evaluated them for the type of content (see an example in Curtis et al. 2015).

Those unequivocally containing information regarding the European rabbit as a pest in Spain were selected for analysis, while all websites that bore no relation to rabbit damage in Spain were discarded. Among those ruled out for analysis were sites dealing with pest rabbits in regions where the species is an invasive alien or others advertising multiple items for sale, including pet rabbits. The websites selected mostly included news in the media regarding rabbit damage to crops and/or transport infrastructures (e.g. motorways and railways), discussion forums in hunters’ and farmers’ websites, and blogs. Written material, such as newspaper and website articles, has previously been used to document the spread of small mammals that cause crop damage (Peacock 2009; Luque-Larena et al. 2013; Peacock and Abbot 2013), and particularly to analyse rumours on “secret” introductions of wildlife pests (e.g. Skogen et al. 2008).

I converted the selected websites to portable document format (PDF) files using Adobe® Acrobat® 9 Pro. These were imported into NVivo software version 10 (QSR International 2015), which was used to assist in the analysis of text material (e.g. Bazeley and Jackson 2013; Cleland et al. 2015). Data analysis consisted of reading and re-reading each text to identify main themes, ideas and topics. This thematic approach is very effective when it comes to describing datasets in great detail (Braun and Clarke 2006), and is increasingly used in environmental studies (e.g. Fischer et al. 2013; Cong et al. 2014). The analysis involved three procedures. Firstly, I conducted a pre-analysis of the dataset to identify rumours about the introduction of rabbits in rabbit-damaged areas. As rumours are by definition unverified (Skogen et al. 2008), I checked the texts carefully to ensure that they did not contain any strong evidence of rabbit introduction.

Secondly, I read through each text several times and used open coding to group recurrent topics (Peterson et al. 2010). Codes are tags or labels for assigning units of meaning to the descriptive or inferential information compiled during a study (Miles and Huberman 1994). In other words, I assigned a particular code to sentences (or paragraphs) corresponding to the same topic (Table 1). I did not start with a specific list of codes because there is no theoretical framework on rumours about rabbit introductions. I instead searched specifically for recurring topics associated with rumours in the context of rabbit management conflict, as this was one of the goals of the study. In addition, some topics discussed in previous studies into rumours about wildlife pest introductions helped define the codes. For example, I decided to code for physical differences between native and allegedly introduced rabbits (see results) not only because this topic recurred in the texts, but also because Skogen et al. (2008) documented similar arguments in the case of wolves.

Table 1 Main themes and subthemes identified during the analysis of the texts. “No. of sources” refers to the number of websites in which each theme or subtheme was identified. “No. of references” refers to the total number of times that each theme or subtheme was identified in the texts; note that each theme or subtheme may appear several times in the same website. “Quotation reference” is the identifier assigned to specific quotations in Table 2, which serve as examples to illustrate the main themes and subthemes

Theme	Subtheme	No. of sources	No. of references	Quotation reference (see Table 2)
Nature of allegedly introduced rabbits	Non-autochthonous rabbits	15	19	Q1
	Mountain rabbits	3	3	Q2
	Australian rabbits	9	11	Q3
	Hybrid rabbits	14	15	Q4
	Domestic rabbits	4	7	Q5
	<i>Sylvilagus</i> rabbits	4	5	Q6
	Total	38	59	
Differences between allegedly introduced and native rabbits	Size	15	16	Q7
	Colour	6	6	Q8
	Other physical aspects	8	10	Q9
	Disease resistance	18	18	Q10
	Reproduction rates	15	17	Q11
	Voracity	9	9	Q11
	Other behavioural differences	13	18	Q12
	Total	30	45	
Rabbit management conflict	Tensions between stakeholders	21	38	Q13, Q14
	Responsibility	13	17	Q15
	Illegal practices	5	10	Q16
	Demands	28	44	Q17, Q18, Q19
	Total	33	72	

In the third procedure, I organised these codes into a few main themes related to rumours about the introduction of rabbits that damage human interests (Table 1). This descriptive approach is a key early stage in qualitative research (Bazeley 2009), and provides a broad picture of the matter under consideration.

Sharing data with colleagues can serve as a reality check on the compiler’s own interpretation, and discussing data, in particular, often creates added awareness of certain dimensions in the data and prompts fresh ideas (Bazeley 2009). In this study, discussing my data with colleagues in my research group (particularly Dr R. Villafuerte, one of the foremost experts in rabbit management) helped define and redefine codes as well as identify main themes.

In summary, I followed an inductive approach, starting with the identification of subcategories and subsequently grouping them into main categories or themes (Peterson et al. 2010). The results present a brief description of every theme and its main subcategories. Although I used a qualitative analysis, which by its very nature relies on non-numerical information (Miles and Huberman 1994), I chose to use a (semi-)quantified approach to present the results within each main theme (Table 1; see also Anderson 2010), because it can help readers to gain a sense of how

widespread or common a particular view is (Seale and Silverman 1997). However, these values bear no reflection on the importance of each theme (or subcategory). I also illustrated the main findings with specific quotes identified during the analysis (Table 2). For clarity, all quotations are displayed in italics and within double quotation marks. Finally, I explored the relationships between codes by creating a coding matrix using the query functions in the Nvivo software (Bazeley and Jackson 2013). The resulting matrix provided the number of sources and references where two codes co-existed (Table 3), and thus the frequency with which pairs of topics were mutually associated could be evaluated (Bazeley 2009).

RESULTS

The Google search yielded a total of 306 unique texts containing information about the European rabbit as a pest in Spain. Among these, 38 presented rumours about the alleged introduction of rabbits, which were often blamed for causing damage to human interests, such as crops or transport infrastructures. Most of the information about rabbit-related rumours came from news in online media

Table 2 Examples of quotations used to illustrate the main themes and subthemes identified during the analysis of the texts. “Quotation reference” corresponds to the identifier used in Table 1

Theme	Quotation reference (see Table 1)	Quotation
Nature of rabbits	Q1	“...but a farmer from Les Garrigues reports that many of the rabbits he finds are not the autochthonous species in the area...”
	Q2	“The Unió (a farming association) has detected Internet publicity that offer the possibility of populating game estates with mountain rabbits in order to increase game availability, which is alarming because there is a (rabbit) plague...”
	Q3	“Australian rabbits don’t have anything to do with other rabbits. Their main characteristic is their bulging eyes and they are the best climbers. I have a friend who formerly bred them, and they climbed the metal fences (where they were kept)... It’s a big problem for this village, where most (people) live off the land, either for cereal crops or for fruit trees...”
	Q4	“In its regional convention, ASAJA Cuenca (a farming organization) confirmed the serious damage caused to crops and infrastructures by hybrid rabbits”
	Q5	“... an environmental technician who works releasing rabbits for lynxes told me that they have discovered what is called a pest gene, which is nothing more than releasing domestic rabbits. It seems that releasing this type of rabbit, which produces more kittens and enters heat more readily, induces the reproduction of autochthonous wild rabbits in the area around the release site, meaning they breed more successfully than usual”
	Q6	“What do you think about the rabbit pest we have in our vineyards? The government doesn’t do anything to eradicate the famous American rabbit. There are people desperately watching how they (the rabbits) eat their crops day after day”
Differences between introduced and native rabbits	Q7	“...the origin of this pest is a rabbit hybrid that is bigger than those usually seen in the countryside”.
	Q8	“We identify them (the exotic rabbits) by their colours which differ from those of autochthonous rabbits”
	Q9	“...more experienced hunters are surprised about the number of rabbits and their diversity: there are greyish autochthonous rabbits with a fine coat, 1 kg, other brownish rabbits which are bigger, and a third, smaller species with a rough coat”
	Q10	“(introduced) rabbits have become immune to myxomatosis, a lethal disease that used to exterminated hundreds of animals in a few days”
	Q11	“...this species is considered a pest in the affected regions because of the voracity and high reproduction rate of these animals...”
	Q12	“this rabbit, which we find in the region of Valencia, is diurnal, thrives only in areas where it can dig warrens easily...”
The rabbit management conflict	Q13	“La Unió (a farming association) condemns the government’s passivity against the unstoppable rabbit pest...”
	Q14	“(the farmer) claimed that many of the rabbits he finds aren’t an autochthonous species in the area, and swears that he hasn’t been allowed to undergo tests and prove it”
	Q15	“...this is very easy...if they (the hunters) introduce a non-autochthonous species that devastates (crops), others introduce non-autochthonous species (referring to rabbit predators) that devastate rabbits and hares... Every day I see more foxes, especially dead foxes...they are left by hunters...”
	Q16	“The farmer, who doesn’t want to give his name or allow us to take photographs which may identify him, says: there’s no other option than breeding a family of ferrets to kill rabbits – this is only legal during the hunting season-... He uses snares and traps too”
	Q17	“Vela (a farming association representative) requested that hunters participate more in controlling the species... The (farming) sector demands, he added, greater control of rabbit restocking too, because they believe a variety of non-autochthonous species are responsible for the damage”
	Q18	“Sánchez-Seoane (a farming association secretary) highlighted another request; reform of the obsolete hunting law, as it ensures protection for rabbits that does not correspond to the current population surplus”
	Q19	“...The farming association has requested that the species be considered a pest in the affected regions, due to its voracity and high reproduction rate...”

Table 3 Matrix coding created through the query functions in the Nvivo software to explore the relationships between codes. Subthemes identified during the analysis are shown in rows and columns, grouped into main themes. Figures shown above the grey line represent numbers of sources of information (i.e. websites) where two codes co-existed. Figures below the grey line represent numbers of references where two codes co-existed

		Nature of introduced rabbits							Differences between introduced and native rabbits							The rabbit management conflict		
		NA	MR	AR	HY	DO	SY	SI	CO	OTP	DI	RE	VO	OTB	TE	RP	IP	DE
		NA	MR	AR	HY	DO	SY	SI	CO	OTP	DI	RE	VO	OTB	TE	RP	IP	DE
Differences between introduced and native rabbits	Nature of introduced rabbits	NA	0	0	3	1	0	5	5	3	4	5	4	7	5	3	2	8
		MR	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	2
		AR	0	0	0	0	0	1	0	2	2	1	1	4	1	2	0	0
		HY	3	0	0	2	1	6	1	0	7	5	4	1	3	2	0	5
		DO	1	0	0	2	0	0	0	1	0	1	0	1	1	1	0	0
		SY	0	0	0	1	0	0	0	1	1	1	0	2	1	0	0	0
		SI	5	0	1	6	0	0	4	4	6	4	4	3	0	2	0	4
		CO	5	0	0	1	0	0	4	2	0	0	0	0	2	1	1	3
		OTP	3	0	2	0	1	4	2	2	3	0	4	2	1	0	0	1
		DI	4	1	2	7	0	6	0	2	12	8	5	3	1	0	0	10
The rabbit management conflict		RE	5	1	1	5	1	4	0	3	12	6	7	2	2	0	0	8
		VO	4	0	1	4	0	4	0	0	8	6	5	0	1	0	0	6
		OTB	8	0	4	1	1	2	3	0	5	8	5	1	2	0	0	4
		TE	5	1	2	3	1	0	2	2	3	2	0	1	9	5	15	
		RP	3	0	2	2	0	2	1	2	1	2	1	2	11	0	0	4
		IP	2	0	0	0	0	0	1	0	0	0	0	0	7	0	2	
		DE	8	2	0	5	0	4	3	1	10	8	6	4	17	4	2	

(1) Nature of introduced rabbits → NA: Non-autochthonous rabbits; MR: Mountain rabbits; AR: Australian rabbits; HY: Hybrid rabbits; DO: Domestic rabbits; SY: *Sylvilagus* rabbits; (2) Differences between introduced and native rabbits → SI: Size; CO: Colour; OTP: Other physical aspects; DI: Disease resistance; RE: Reproduction; VO: Voracity; OTB: Other behavioural differences; (3) The rabbit management conflict → TE: Tensions between stakeholders; RP: Responsibility; IP: Illegal practices; DE: Demands

($n = 22$ websites), and less frequently from features published in farming and hunting websites ($n = 9$) and discussions in online forums ($n = 7$). The analysis identified three main themes within these rumours (Table 1). Firstly, reviewed websites usually referred to introduced rabbits that were allegedly different to those that originally constituted the native population. Secondly, there was a purported experiential basis for these accounts: alleged observations of unnatural behaviour, physiology or physical appearance of introduced rabbits. And thirdly, rumours were frequently used in the context of the rabbit management conflict in Spain.

Nature of introduced rabbits

The texts contained many references to the introduction of rabbits other than native populations (hereafter “exotic rabbits”; Table 1). Journalists, farmers and hunters interviewed in the media, bloggers and anonymous participants in online hunting or farming forums often mentioned “non-autochthonous” rabbits (Q1 in Table 2). In many cases, informants either did not specify or were ambiguous as to the type of rabbits they were discussing. Some people said that these rabbits did not belong to the same (native) species, whereas others stated that they were a different

variety of rabbit. Some informants only pointed out that introduced rabbits were simply different to those typically found in the area. Nevertheless, other informants gave more detailed descriptions. For example, there were a few mentions of “mountain rabbits” (Q2 in Table 2). The presence of “Australian rabbits” (Q3 in Table 2) was also reported. In addition, the texts frequently mentioned “hybrid rabbits” (Q4 in Table 2), and there were a few examples of “domestic rabbits” (Q5 in Table 2). Finally, the most extreme case of exotic rabbits present in Spain, according to the texts reviewed in this study, referred to rabbits of the American genus *Sylvilagus* (Q6 in Table 2).

Differences between allegedly introduced and native rabbits

There were frequent references in the text material to physical, physiological and behavioural differences between allegedly introduced rabbits and native rabbits (Table 1). The most widespread comment in terms of morphology was that introduced rabbits were different in size; it was generally said that they were much bigger than autochthonous rabbits (Q7 in Table 2). There was also a relatively frequent perception that exotic rabbits have a particular colour of fur that differs from native rabbits (Q8 in Table 2). Other differences between the physical appearances of native and introduced rabbits were also mentioned in the analysed websites, but less frequently than those concerning the rabbit size and colour. These included comments about distinct fur types and allegedly bulging eyes attributed to exotic rabbits (Q9 in Table 2).

The most widespread notion of unnatural physiological characteristics of exotic rabbits was related to their presumed higher resistance to diseases (Q10 in Table 2). Furthermore, people who gave their opinion in the websites frequently believed that exotic rabbits reproduced more successfully than autochthonous rabbits (Q11 in Table 2); in general, it was thought that introduced rabbits reproduced rapidly and excessively, and were sexually mature earlier in life than native rabbits. Many of these reports also stated the introduced rabbits were much more voracious than native animals (Q11 in Table 2). Other behavioural characteristics were also attributed to introduced rabbits in the written material, but references to these were less frequent. For instance, there were several mentions of exotic rabbits with good climbing skills, which, in the informants' view, helped the animals reach the highest branches in olive trees or the highest bunches of grapes. These rabbits were also regarded as notable diggers on some websites (Q12 in Table 2). There were a few suggestions that exotic rabbits adapted easily to new conditions when introduced to new areas.

Beliefs about the allegedly higher resistance to diseases, more successful reproduction, greater voracity and other unnatural abilities of introduced rabbits often correlated with one another. These were often expressed together with perceived physical differences between introduced and native rabbits. Most of these purported differences were used in reference to non-autochthonous or hybrid rabbits (Table 3).

The rabbit management conflict

There were many indications in the texts of the existence of conflicts between stakeholders regarding the management of rabbit pests (Table 1), with many of them linked to accounts of alleged rabbit introductions. Indeed, tensions among parties were notable in most of the analysed websites. Most of these involved farmers, who usually complained about the role of hunters and/or policy makers in the management of pest rabbits. In this sense, farmers often accused policy makers of not doing all that they could to stop the pest, and sometimes of not permitting identification of whether or not rabbits causing damage were non-autochthonous (Q13 and Q14 in Table 2). Farmers' criticisms towards hunters were even more frequent and stronger. Farmers often thought that hunters were not sufficiently involved in rabbit control, thus contributing to its inefficiency. Along this line, farmers made several comments about the passivity of hunters when it came to getting rid of rabbits (and reducing their damage), as they believed that eradicating rabbits by hunters would mean the end of rabbit hunting in the following years.

In addition, farmers often blamed hunters for being responsible for rabbit pests, either for releasing harmful, exotic rabbits or for killing predators that otherwise would control rabbit populations naturally (Q15 in Table 2). This accusation was frequently linked to discourses that showed the tension existing between farmers and hunters (Table 3). In terms of responsibility for releasing exotic rabbits, a few hunters stated that the problem arose in other game estates that released such animals, suggesting certain clashes within the hunting sector. On certain occasions, hunters also expressed their disagreement with farmers and policy makers. For example, they complained about policy makers' lack of flexibility in granting rabbit control permits. Nevertheless, these views were generally more moderate than those of farmers.

There were some references in the written material to illegal practices aimed at eradicating rabbits. On one hand, a few farmers acknowledged that they used illegal practices like trapping or snaring to control rabbits (Q16 in Table 2). While on the other hand, some farmers and hunters complained because they were neither allowed to use certain

illegal management tools, such as poisoning, nor to shoot rabbits near highways (where rabbits often dig their warrens). In both cases, tensions between stakeholders could be noted (Table 3).

In this context, frequent demands to stop or mitigate rabbit damage arose in the texts. Such demands were often expressed in statements demonstrating a degree of tension between stakeholders (Table 3). In addition, people often demanded solutions while basing their arguments on the exotic nature of allegedly introduced rabbits as well as their perceived physical and behavioural differences with native rabbits (Table 3). Most demands came from farmers, although hunters sometimes requested solutions to this problem as well. In some cases, farmers expressed that rabbit restocking, and particularly the release of exotic rabbits (Q17 in Table 2), should be halted. It was requested on some websites that tests be carried out to demonstrate that the damage-causing rabbits were non-native. In addition, legislative reforms were frequently demanded. For example, some farmers requested that the current hunting law be amended, since it was viewed as obsolete and protective for rabbits (Q18 in Table 2). Similarly, some farmers in Castilla-La Mancha (central Spain) claimed that a regional law labelling rabbits as “game species of preferential interest” was invalid as the pest was constituted, in the majority, by hybrid rabbits, which, according to their statements, had never been seen before in the field. In fact, farmers often requested an official declaration regarding rabbit pests, which was usually associated with the demand for management tools to mitigate losses caused by rabbits (Q19 in Table 2). On some occasions, a global management plan was requested, but other people wanted more specific actions. These included, for example, cutting out natural vegetation used by rabbits as refuge near crops and/or fencing motorways and railways, where rabbits dig warrens but hunting is not allowed. There were also demands to extend the regular hunting season and recruit hunters from other areas. In this sense, some farmers requested permission to control rabbits themselves. Finally, a few farmers demanded financial compensation for rabbit losses, but this was not very common throughout the texts.

DISCUSSION

Rumours and human–nature interactions

As the human population continues to increase across much of the world, people increasingly interact with nature (Fig. 1). In a context of human-dominated ecosystems, human perceptions and understandings of nature rise in importance. In fact, the words “nature” and “environment” are often used to represent different

perceived realities for different stakeholders. For example, while farmers usually discuss the land in terms of a working space, environmentalists perceive landscapes as ecosystems that must be managed in order to maintain biological diversity. This difference is particularly evident when wildlife is involved (Fig. 1), as many species generate strong feelings (either positive or negative) among humans (Goedeke 2005; Herrmann et al. 2013). As such, different stakeholders construct vastly different definitions of the same species. For example, some species are frequently the focus of deep-seated loathing among certain groups, but others value them positively for aesthetic, economic or ecological reasons (Delibes-Mateos et al. 2011; Johnson and Sciascia 2013; Lopes-Fernandes et al. 2016). The present study constitutes a good example of this complex relationship between people and nature, and particularly wildlife, as Spanish farmers see European rabbits as a nuisance or pest wildlife, while hunters value them as a game resource. These competing views of wildlife and nature are at the core of social conflicts over species management (Fig. 1; see also Delibes-Mateos 2015), as occurs in the case of Spanish rabbits.

In a human-dominated world, environmental management largely depends on fragile agreements reached through often long and difficult negotiations between stakeholders with very conflicting interests. Therefore, environmental management and conversation go hand-in-hand. In this context, stakeholders usually employ a diverse array of persuasive methods of communication like rhetorical discourses and metaphors to effectively communicate their role in environmental management to the audience and to legitimise their involvement in such management (Larson 2011). For example, NGOs interested in bird conservation in Malta have developed sophisticated military metaphors to describe, guide and legitimise their activities against hunting to the public and their fee-paying members (Campbell and Veríssimo 2015). Metaphors are often used to legitimise claims about the management of invasive species such as the lionfish (*Pterois* sp.; Carballo-Cárdenas 2015). Similarly, rumours about wildlife are often used as a simple and effective way in which stakeholders can communicate and legitimise the importance of their efforts and involvement in the management of wildlife populations to their own collective and other parties (Fig. 1; see also Campion-Vincent 2005).

The present study shows that rumours about the release of crop-damaging European rabbits are relatively common in some farmland areas across Spain. This closely mirrors other wildlife-release rumours elsewhere (e.g. Campion-Vincent 1990b; Bruno and Maugeri 1992; Skogen et al. 2008; Blackman et al. 2013), and particularly in the Iberian

Peninsula (Benejam et al. 2007; Viñuela et al. 2010; Alvares et al. 2011). For local people who have to cope with the disturbances caused by wildlife, the introduction (or perceived introduction) of wildlife corresponds to the appearance of a new intruder in their environment. In these circumstances, rumours are generally used to communicate people's frustration because their livelihood is threatened by wildlife, and thus to express their resistance to the introduction of wild animals (Skogen et al. 2008). Animal-release rumours therefore correspond to the indirect expression of fears about the personal impact of wildlife. In this study, the conviction that rabbits had been introduced was chiefly held by the most vehement rabbit adversaries, i.e. farmers.

Stakeholders affected by wildlife damage are likely to portray allegedly introduced animals as out of place in the contemporary environment. The presence of allegedly introduced wild animals is therefore usually described in rumours as problematic, because their behaviours and needs are incompatible with the modern landscape in which human needs are the priority. The context in this study was different from that in other wildlife-release stories (e.g. Goss 1992; Benejam et al. 2007; Slow et al. 2013) as wild rabbits have always existed in most Spanish farmland areas (Palomo et al. 2007). Nevertheless, allegedly introduced rabbits could be identified in the texts because the animals were considered to differ from those forming native populations. On the websites, informants reported the existence of different types of introduced rabbits, including domestic rabbits, hybrid rabbits, Australian rabbits or American *Sylvilagus* rabbits. Farmers did not perceive such rabbits as a part of nature, but instead saw them as exotic interlopers. A similar sentiment was expressed by anglers and pond owners when the population of the North American river otters (*Lutra canadensis*) was restored in Missouri (Goedeke 2005). The discourse regarding the high voracity of rabbits perceived to be introduced cast them as animals that were intentionally stealing resources away from people. In fact, allegedly introduced wild animals are usually associated with negative connotations by those who develop rumours (Campion-Vincent 2005; Skogen et al. 2008). Wildlife pest adversaries' solutions are synchronous with their construction of the allegedly introduced animals. They believe such species are of little value, and thus could be reduced drastically or, better yet, completely eradicated with no harmful effects on the environment.

Rumours and conflicts over wildlife management

In general, wildlife pest adversaries believe that alleged wildlife introductions are conducted by environmentalists or

an alliance of environmentalists with government agencies. For example, it is often thought that these parties release predators such as wolves to restore their populations (Skogen et al. 2008; Alvares et al. 2011) and/or prey species such as rodents to feed raptors (Viñuela et al. 2010). In contrast, farmers in this case study believed that hunters were responsible for releasing rabbits. Interestingly, some hunters also shared this belief, but they generally subscribed more moderate views and did not take a particularly aggressive stance towards rabbits, as farmers often did.

Therefore, rumours about wildlife introductions are usually accusatory tales (Campion-Vincent 2005; Skogen et al. 2008). Hunters were accused by farmers of favouring their game interests by releasing rabbits at the expense of farming interests. In the cases of predators and rodents, environmentalists and governments are usually blamed for giving priority to nature (including animal species which are potentially dangerous for humans) over people (Campion-Vincent 2005). In this context, wildlife-release rumours can play an important role in conflicts about wildlife management (Fig. 1), since they may cause additional tensions between stakeholders. In addition, rumours may also increase previously existing tensions. For example, Spanish farmers usually think that hunters do not assume a sufficient role in rabbit control, which disgruntles both parties. Farmers' belief that hunters are responsible for rabbit introductions may exacerbate these points of contention.

The belief that rabbits had been introduced often led to demands, particularly by farmers, to control rabbits and their damage. Similarly, wolf opponents often consider that the fact that these animals have been allegedly released deliberately legitimises their calls for eradication (Campion-Vincent 2005; Skogen et al. 2008). Demands by farmers for solutions to stop rabbit damage has forced policy makers to implement emergency measures in some areas; i.e. new regional regulations have been approved with the specific aim of guiding rabbit control (see Delibes-Mateos et al. 2014a for details). Interestingly, some hunters also demanded solutions to mitigate crop damage caused by rabbits, probably because they are the focus of farmers' complaints. Some hunters requested specific measures to kill rabbits (e.g. extending the hunting season). Besides reducing tensions with farmers, this could be interpreted as a manoeuvre to increase the opportunity to hunt rabbits (see also Ríos-Saldaña et al. 2013). Surprisingly, very few farmers demanded economic compensation for rabbit damage, although this has often been paid to compensate losses caused by wildlife, particularly predators (e.g. Naughton-Treves et al. 2003). A potential explanation is that farmers' hope of receiving subsidies for rabbit damage was probably very low. Nevertheless, further research is needed to clarify this point.

The approach followed in this study can be used to assess wildlife-release rumours and their role in wildlife management conflicts. Firstly, qualitative studies may shed light on the interpretations and meanings held by stakeholders that, while not necessarily supported by current scientific evidence, play an important role in informing stakeholder understandings (and related actions/positions) of the issue at hand. Secondly, the media and the Internet actively participate in the spread of anomalies, such as the introduction (or alleged introduction) of non-native animals (e.g. Delibes-Mateos and Delibes 2013). As such, online media may constitute a good source of information for these kinds of study. The validity of forums and/or informal chats on the Internet is more questionable because they generally receive much less scrutiny before online publication. Nevertheless, this information may be used to open new studies into the alleged introduction of wildlife and/or to confirm available records of species introductions (Benejam et al. 2007).

Potential veracity of rumours and their negation by conservation biologists

Environmentalists, including conservation biologists, frequently regard rumours to be false (Campion-Vincent 2005). However, rumours, and particularly those about wildlife introductions, can be accurate and meaningful, and therefore deserve analytical interpretation (Campion-Vincent 2005). In Spain, hunters usually release rabbits to recover their populations, and these actions are conducted frequently without the approval of the corresponding regional government (Delibes-Mateos et al. 2008c). Considering this point, it is not hard to believe that secret introductions of rabbits may occur, which suggests that at least some of the rumours analysed in this study could be true. Similarly, some people declared in the texts that domestic or hybrid rabbits were released in their localities, and indeed it is known that some Spanish hunters have sometimes used domestic rabbits and/or domestic–wild rabbit hybrids in restocking operations (Piorno et al. 2015). Even the Delivering Alien Invasive Species Inventories for Europe (DAISIE 2009) records the introduction of *Sylvilagus* rabbits in Spain and agrees with some of the analysed websites.

A commonly held notion in the study data was that allegedly introduced rabbits differed in physical appearance to native rabbits. For example, it was often thought that the newcomers had different coloured fur and were larger. At least in some cases this could be explained by the fact that rabbits belonging to the subspecies occurring in south and north-western Iberia (*Oryctolagus cuniculus algirus*) are on average smaller than those of the subspecies present in north-eastern Spain (*Oryctolagus cuniculus*;

cuniculus; Ferreira et al. 2015), and that rabbits of one subspecies are often released in the distribution area of the other (Delibes-Mateos et al. 2008c). In addition, it is not surprising that allegedly introduced rabbits were believed to be more resistant to rabbit diseases as they are one of the main limiting factors of rabbit populations (Calvete 2006), and populations in rabbit-damaged areas (which are subject to rumours) are usually characterised by high rabbit numbers and/or sudden population growth (Barrio et al. 2010). There were also many references in the texts to unnatural behaviour of allegedly introduced rabbits. For example, it was often stated that they reproduced faster, were good climbers and more voracious. Some of these differences may be supported by biological studies. For example, reproduction differences have been observed between rabbit subspecies (Gonçalves et al. 2002). Conversely, other perceived differences, such as those related to rabbit voracity, have never been documented in scientific studies. In any case, the veracity of the arguments expressed in the websites analysed has not yet been tested, and therefore these are still unconfirmed accounts. Besides their veracity, statements about unnatural characteristics of introduced rabbits were perceived as proof that rabbits had been introduced (Table 3), and therefore that they were exotic. Similar arguments have been used in other wildlife-introduction stories (Skogen et al. 2008).

CONCLUSIONS

This manuscript presents an exploratory, descriptive analysis that points to the importance of rumours in conservation and environmental management. It emphasises that studying rumours is important because they shed light on critical aspects of how humans engage with their environment and wild species. Accordingly, paying attention to rumours may help us to contemplate social–ecological relations, for instance, by highlighting the central role of values and narratives in links between humans and nature. In this context, I encourage further research for a more detailed investigation of the discourses of stakeholders involved in wildlife-release rumours. Thus, the differences in the characteristics and boundaries of particular themes could be assessed across contrasting demographic groups or across variations in context (Bazeley 2009), which was impossible in the present study due to the nature of available data. Overall, a more in-depth analysis will help increase our understanding of the position of parties involved in conflicts associated with the (alleged) introduction of wildlife species that cause damage to human livelihood. Such research may contribute to mitigating human–wildlife conflicts.

Acknowledgements I thank Dr Rafael Villafuerte, Erik Andersson, A. Jasmyn J. Lynch and one anonymous reviewer for helpful comments on previous drafts of the manuscript and all the colleagues who provided me some key references for this study. Discussions with colleagues in my research group helped define and redefine codes as well as identify main themes. This project was supported by the Talentia Postdoc Program launched by the Andalusian Knowledge Agency, and co-funded by the European Union's Seventh Framework Program, Marie Skłodowska-Curie actions (COFUND—Grant Agreement n267226) and the Ministry of Economy, Innovation, Science and Employment of the Junta de Andalucía. I am currently supported by V Plan Propio de Investigación of the University of Sevilla.

REFERENCES

- Alda, F., M.J. Ruiz-López, F.J. García, M.E. Gompper, L.S. Egger, and J.T. García. 2013. Genetic evidence for multiple introduction events of raccoons (*Procyon lotor*) in Spain. *Biological Invasions* 15: 687–698.
- Allport, G.W., and L. Postman. 1947. *The psychology of rumour*. New York: Holt, Rinehart & Winston.
- Alvares, F. 1999. Are releasing wolves? *Boletim informativo do Grupo Lobo* 14: 1–3 (in Portuguese).
- Alvares, F., J. Domingues, P. Sierra, and P. Primavera. 2011. Cultural dimension of wolves in the Iberian Peninsula: Implications of ethnozoology in conservation biology. *Innovation: The European Journal of Social Science Research* 24: 313–331.
- Anderson, C. 2010. Presenting and evaluating qualitative research. *American Journal of Pharmaceutical Education* 74: 141. Retrieved 15 February, 2016, from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2987281/>.
- Barrio, I.C., C.G. Bueno, and F.S. Tortosa. 2010. Alternative food and rabbit damage in vineyards of southern Spain. *Agriculture, Ecosystems & Environment* 138: 51–54.
- Bazeley, P. 2009. Analysing qualitative data: More than identifying themes. *Malaysian Journal of Qualitative Research* 2: 6–22.
- Bazeley, P., and K. Jackson. 2013. *Qualitative data analysis with NVivo*. London: Sage.
- Benejam, L., J. Carol, J. Benito, and E. García-Berthou. 2007. On the spread of the European catfish (*Silurus glanis*) in the Iberian Peninsula: First record in the Llobregat river basin. *Limnetica* 26: 169–171.
- Blackman, D., A. Corcoran, and S. Sarre. 2013. Are there really foxes: Where does the doubt emerge? *Journal of Knowledge Management Practice* 14. Retrieved 23 May, 2016, from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2241882.
- Braun, V., and C.V. Clarke. 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology* 3: 77–101.
- Bruno, S., and S. Maugeri. 1992. *Guide of snakes of Europe*. Barcelona: Ediciones Omega (in Spanish).
- Cabral, M., J. Almeida, P.R. Almeida, T. Dellinger, N. Ferrand de Almeida, E. Oliveira, J.M. Palmeirim, A.I. Queiroz, et al. 2005. *Red book of vertebrates in Portugal*. Lisbon: Instituto da Conservação da Natureza e das Florestas (in Portuguese).
- Calvete, C. 2006. Modeling the effect of population dynamics on the impact of rabbit hemorrhagic disease. *Conservation Biology* 20: 1232–1241.
- Campbell, B., and D. Veríssimo. 2015. Black stork down: Military discourses in bird conservation in Malta. *Human Ecology* 43: 79–92.
- Campion-Vincent, V. 1990a. Contemporary legends about animal-releases in rural France. *Fabula* 31: 242–253.
- Campion-Vincent, V. 1990b. Stories of viper releases. A contemporary French legend. *Ethnologie Française* 20: 143–155 (in French).
- Campion-Vincent, V. 2005. The restoration of wolves in France: Story, conflicts and use of rumour. In *Mad about wildlife: Looking at social conflict over wildlife*, ed. A. Herda-Rapp and T.L. Goedeke, 99–122. Leiden: Brill.
- Carballo-Cárdenas, E.C. 2015. Controversies and consensus on the lionfish invasion in the Western Atlantic Ocean. *Ecology and Society* 20: 24.
- Cerriaco, L. 2012. Human attitudes towards herpetofauna: The influence of folklore and negative values on the conservation of amphibians and reptiles in Portugal. *Journal of Ethnobiology and Ethnomedicine* 8: 8.
- Cleland, V., C. Hughes, L. Thornton, A. Venn, K. Squibb, and K. Ball. 2015. A qualitative study of environmental factors important for physical activity in rural adults. *PLoS ONE* 10: e0140659. doi:10.1371/journal.pone.0140659.
- Cong, L., B. Wu, A.M. Morrison, H. Shu, and M. Wang. 2014. Analysis of wildlife tourism experiences with endangered species: An exploratory study of encounters with giant pandas in Chengdu, China. *Tourism Management* 40: 300–310.
- Curtis, B., K. Alanis-Hirsch, O. Kaynak, J. Cacciola, K. Meyers, and A.T. McLellan. 2015. Using web searches to track interest in synthetic cannabinoids (aka “herbal incense”). *Drug and Alcohol Review* 34: 105–108.
- DAISIE—Delivering Alien Invasive Species Inventories for Europe. 2009. *Sylvilagus floridanus*. In *European Invasive Alien Species Gateway*. Retrieved 22 February, 2015, from <http://www.europe-aliens.org/speciesFactsheet.do?speciesId=52904>.
- Delibes-Mateos, M. 2015. Conservation conflicts involving mammals in Europe. *Therya* 6: 123–137.
- Delibes-Mateos, M., and A. Delibes. 2013. Pets becoming established in the wild: Free-living Vietnamese potbellied pigs in Spain. *Animal Biodiversity and Conservation* 36: 209–215.
- Delibes-Mateos, M., P. Ferreras, and R. Villafuerte. 2008a. Rabbit populations and game management: The situation after 15 years of rabbit haemorrhagic disease in central-southern Spain. *Biodiversity and Conservation* 17: 559–574.
- Delibes-Mateos, M., M. Delibes, P. Ferreras, and R. Villafuerte. 2008b. Key role of European rabbits in the conservation of the Western Mediterranean Basin Hotspot. *Conservation Biology* 22: 1106–1117.
- Delibes-Mateos, M., E. Ramirez, P. Ferreras, and R. Villafuerte. 2008c. Translocations as a risk for the conservation of European wild rabbit *Oryctolagus cuniculus* lineages. *Oryx* 42: 259–264.
- Delibes-Mateos, M., P. Ferreras, and R. Villafuerte. 2009. European rabbit population trends and associated factors: A review of the situation in the Iberian Peninsula. *Mammal Review* 39: 124–140.
- Delibes-Mateos, M., A.T. Smith, C. Slobodchikoff, and J.E. Swenson. 2011. The paradox of keystone species persecuted as pests: a call for the conservation of abundant small mammals in their native range. *Biological Conservation* 144: 1335–1346.
- Delibes-Mateos, M., C. Ferreira, C. Rouco, R. Villafuerte, and I.C. Barrio. 2014a. Conservationists, hunters and farmers: The European rabbit *Oryctolagus cuniculus* management conflict in the Iberian Peninsula. *Mammal Review* 44: 190–203.
- Delibes-Mateos, M., C. Ferreira, F. Carro, M.A. Escudero, and C. Gortázar. 2014b. Ecosystem effect of variant rabbit hemorrhagic disease virus, Iberian Peninsula. *Emerging Infectious Diseases* 20: 2166–2168.
- Dendle, P. 2006. Cryptozoology in the Medieval and Modern Worlds. *Folklore* 117: 190–206.
- Ferrand, N. 2008. Inferring the evolutionary history of the European rabbit (*Oryctolagus cuniculus*) from molecular markers. In *Lagomorph biology: Evolution, ecology and conservation*, ed. P.C. Alves, N. Ferrand, and K. Hackländer, 47–63. Berlin: Springer.

- Ferreira, C., F. Castro, V. Piorno, I. Barrio, M. Delibes-Mateos, R. Rouco, L. Mínguez, F. Aparicio, et al. 2015. Biometrics reveal major differences between the two European rabbit subspecies. *Biological Journal of the Linnean Society* 116: 106–116.
- Fischer, A., V. Kerezi, B. Arroyo, M. Delibes-Mateos, D. Tadie, A. Lowassa, O. Krange, and K. Skogen. 2013. (De)legitimising hunting—Discourse over the morality of hunting in Europe and eastern Africa. *Land Use Policy* 32: 261–270.
- Goedeke, T.L. 2005. Devils, angels or animals: The social construction of otters in conflict over management. In *Mad about wildlife: Looking at social conflict over wildlife*, ed. A. Herda-Rapp and T.L. Goedeke, 25–50. Leiden: Brill.
- Gonçalves, H., P.C. Alves, and A. Rocha. 2002. Seasonal variation in the reproductive activity of the wild rabbits (*Oryctolagus cuniculus algirus*) in a Mediterranean ecosystem. *Wildlife Research* 29: 165–173.
- Goss, M. 1992. Alien big cat sighting in Britain. *Folklore* 103: 184–202.
- Herda-Rapp, A., and T.L. Goedeke. 2005. *Mad about wildlife: Looking at social conflict over wildlife*. Leiden: Brill.
- Herrmann, T.M., E. Schüttler, P. Benavides, N. Gálvez, L. Söhn, and N. Palomo. 2013. Values, animal symbolism, and human–animal relationships associated to two threatened felids in Mapuche and Chilean local narratives. *Journal of Ethnobiology and Ethnomedicine* 9: 41.
- Johnson, B.B., and J. Sciascia. 2013. Views on black bear management in New Jersey. *Human Dimensions of Wildlife* 18: 249–262.
- Kapferer, J.N. 1990. *Rumours. The oldest media in the world*. Seuil (in French): Paris.
- Larson, B. 2011. *Metaphors for environmental sustainability: Redefining our Relationship with Nature*. New Haven and London: Yale University Press.
- Lopes-Fernandes, M., F. Soares, A. Frazão-Moreira, and A.I. Queiroz. 2016. Living with the beast: Wolves and humans through Portuguese literature. *Anthrozoos* 29: 5–20.
- López, C. 2013. A pest of mountain rabbits devastates vineyards in Gata de Gorgos. Lasprovincias.es (in Spanish). Retrieved 26 May, 2016, from <http://www.lasprovincias.es/v/20130425/alicante/plaga-conejos-montana-arrasa-20130425.html>.
- Low, T. 2003. *Feral future: The untold story of Australia's exotic invaders*. Chicago: The University of Chicago Press.
- Luque-Larena, J.J., F. Mougeot, J. Viñuela, D. Jareño, L. Arroyo, X. Lambin, and B. Arroyo. 2013. Recent large-scale range expansion and eruption of common vole (*Microtus arvalis*) outbreaks in agricultural plains of NW Spain. *Basic and Applied Ecology* 14: 432–441.
- MAGRAMA. 2015. *Preview of the annual book of statistics about farming, feeding and environment 2014*. Madrid: MAGRAMA (in Spanish). Retrieved 26 May, 2016, from http://www.magrama.gob.es/estadistica/pags/anuario/2014-Avance/AE_2014_Avance.pdf.
- Miles, M.B., and A.M. Huberman. 1994. *Qualitative data analysis*. Thousand Oaks: Sage.
- Miller, S.D., J.W. Schoen, J. Faro, and D.R. Klein. 2011. Trends in intensive management in Alaska's Grizzly Bears, 1980–2010. *Journal of Wildlife Management* 75: 1243–1252.
- Morgan, H., and K. Tucker. 1984. *Rumor!*. London: Penguin Books.
- Naughton-Treves, L., R. Grossberg, and A. Treves. 2003. Paying for tolerance: Rural citizens' attitudes toward wolf depredation and compensation. *Conservation Biology* 17: 1500–1511.
- Palomo, L.J., J. Gisbert, and J.C. Blanco. 2007. *Atlas and red book of terrestrial mammals in Spain*. Madrid: Dirección General para la Biodiversidad-SECEM-SECEMU (in Spanish).
- Peacock, D. 2009. The grey squirrel *Sciurus carolinensis* in Adelaide, south Australia: Its introduction and eradication. *The Victorian Naturalist* 126: 150–155.
- Peacock, D., and I. Abbot. 2010. The mongoose in Australia: Failed introduction of a biological control agent. *Australian Journal of Zoology* 58: 205–227.
- Peacock, D., and I. Abbot. 2013. The role of quoll (*Dasyurus*) predation in the outcome of pre-1900 introductions of rabbits (*Oryctolagus cuniculus*) to the mainland and islands of Australia. *Australian Journal of Zoology* 61: 206–280.
- Peterson, M.N., J.L. Birkhead, K. Leong, M.J. Peterson, and T.R. Peterson. 2010. Rearticulating the myth of human–wildlife conflict. *Conservation Letters* 3: 74–82.
- Piorno, V., R. Villafuerte, M. Branco, M. Carneiro, N. Ferrand, and P.C. Alves. 2015. Low persistence in nature of captive reared rabbits after restocking operations. *European Journal of Wildlife Research* 61: 591–599.
- QSR International. 2015. *NVivo 10*. Retrieved 15 February, 2016, from <http://www.qsrinternational.com/>.
- Radford, B., J. Nickell, and L. Coleman. 2006. *Lake monster mysteries: Investigating the world's most elusive creatures*. Lexington: The University Press of Kentucky.
- Redpath, S.M., J. Young, A. Evely, W.M. Adams, W.J. Sutherland, A. Whitehouse, A. Amar, R.A. Lambert, et al. 2013. Understanding and managing conservation conflicts. *Trends in Ecology & Evolution* 28: 100–109.
- Redpath, S.M., S. Bhatia, and J. Young. 2015. Tilting at wildlife: Reconsidering human–wildlife conflict. *Oryx* 49: 222–225.
- Ríos-Saldaña, C.A., M. Delibes-Mateos, F. Castro, E. Martínez, J.M. Vargas, B.D. Cooke, and R. Villafuerte. 2013. Control of the European rabbit in central Spain. *European Journal of Wildlife Research* 59: 573–580.
- Sarre, S.D., A.J. MacDonald, C. Barclay, G.R. Saunders, and D.S.L. Ramsey. 2012. Foxes are now widespread in Tasmania: DNA detection defines the distribution of this rare but invasive carnivore. *Journal of Applied Ecology* 50: 459–468.
- Seale, C., and D. Silverman. 1997. Ensuring rigour in qualitative research. *The European Journal of Public Health* 7: 379–384.
- Sidorovich, V.E., L.L. Tikhomirova, and B. Jedrzejewska. 2003. Wolf *Canis lupus* numbers, diet and damage to livestock in relation to hunting and ungulate abundance in northeastern Belarus during 1990–2000. *Wildlife Biology* 9: 103–111.
- Singleton, G.R., L.A. Hinds, C.J. Krebs, and D.M. Spratt. 2003. *Rats, mice and people: Rodent biology and management*. Canberra: Australian Centre for International Agricultural Research.
- Skogen, K., I. Mauz, and O. Krange. 2008. Cry wolf!: Narratives of wolf recovery in France and Norway. *Rural Sociology* 73: 105–133.
- Slow, A., S. Roy, C. Bell, J. Milborrow, and D. Roberts. 2013. On inference about the introduction time of an introduced species with an application to the pine marten on Mull. *Biological Conservation* 159: 4–6.
- Treves, A., and K.U. Karanth. 2003. Human–carnivore conflict and perspectives on carnivore management worldwide. *Conservation Biology* 17: 1491–1499.
- Villafuerte, R., and M. Delibes-Mateos. 2008. The rabbit. In *Atlas and red book of terrestrial mammals in Spain*, ed. L.J. Palomo, J. Gisbert, and J.C. Blanco, 490–491. Madrid: Dirección General para la Biodiversidad-SECEM-SECEMU (in Spanish).
- Viñuela, J., J.J. Luque, J.A. Fargallo, P. Olea, A. Paz, and F. Mougeot. 2010. Conflicts between farming and biodiversity conservation. Vole pests in Castilla y León. In *Family agriculture in Spain 2010*, ed. Unión de Pequeños Agricultores y Ganaderos, 199–206. Madrid: Unión de Pequeños Agricultores y Ganaderos (in Spanish).

Zaldivar, C. 2006. The reptiles of La Rioja: Geographic distribution, gossips and legends. *Páginas de Información Ambiental* 24: 24–27 (in Spanish).

AUTHOR BIOGRAPHY

Miguel Delibes-Mateos (✉) is a Postdoctoral Researcher at the Institute for Advanced Social Studies (IESA-CSIC). His research interests include the complex relationship between biodiversity

conservation and other human activities like hunting or agriculture. *Address:* Instituto de Estudios Sociales Avanzados (IESA-CSIC), Campo Santo de los Mártires 7, 14004 Córdoba, Spain.

Address: Departamento de Biología Vegetal y Ecología, Facultad de Biología, Universidad de Sevilla, Apartado 1095, 41080 Seville, Spain.

e-mail: mdelibesmateos@gmail.com