Crime Law Soc Change (2017) 67:461–480
DOI 10.1007/s10611-016-9670-2

Fear, economic consequences, hunting competition, and distrust of authorities determine preferences for illegal lethal actions against gray wolves (*Canis lupus*): a choice experiment among landowners in Jutland, Denmark

Peter Lyhne Højberg[1] · **Martin Reinhardt Nielsen**[1] · **Jette Bredahl Jacobsen**[1,2]

Published online: 3 December 2016

Abstract After a 200-year absence, the gray wolf recently re-immigrated to Denmark. Where humans and wolves coexist, there is potential for conflict. Using an online survey, we elicit information on attitudes and preferred responses to the presence of wolves among 1500 landowners in rural Jutland. Relying on random utility theory, we used a choice experiment, where respondents were asked to choose between hypothetical scenarios designed to reduce the sensitivity of the subject and thereby reveal whether landowners would respond by illegal actions. We also evaluate the determinants of preferences for these actions. The majority of the sample exhibited a negative attitude towards wolves and the choice experiment revealed that 60% of the sample preferred illegal measures, over moderate measures, whereas the remaining sample preferred to do nothing. A latent class model grouped respondents in four segments based on similarities of preferences. Preference for illegal lethal actions were found among four groups concerned about; (1) negative economic impact; (2) competition over game; (3) safety of humans and domestic animals, and; (4) lack of trust in authorities. Our results do not imply that 60% of landowners in Jutland will illegally kill wolves. However, negative attitudes, particularly when combined with a divide between rural- and urban communities, may promote disregard for regulations and illegal actions against problem species. The rural population should be informed and

✉ Peter Lyhne Højberg
peterhojberg@gmail.com

[1] Department of Food and Resource Economics, University of Copenhagen, Rolighedsvej 25, 1958 Frederiksberg, Denmark

[2] Centre for Macroecology, Evolution and Climate, University of Copenhagen, Rolighedsvej 25, 1958 Frederiksberg, Denmark

involved to improve the legitimacy of management decisions. In addition, changes in attitudes toward wolves should be monitored. The results are interpreted in terms of anthropocentrism and speciesism.

Introduction

The gray wolf (henceforth simply the wolf) re-immigrated to Jutland in 2012 after a 200-year absence from Denmark. Large predators such as the wolf have been subject to persecution in Norway, Sweden and Finland, driven by negative attitudes buttressed by anthropocentrism and speciesism among certain stakeholders towards predators [1–5]. Negative attitudes may be further exacerbated when predators recolonize areas where people have grown unaccustomed to their presence [1]. A number of species-specific traits of wolves, including their extreme adaptability enabling them to settle in densely populated and highly anthropogenic environments; their ability to prey on livestock, and their habituation to people combined with their pack structure, potentially making them a threat to people, further increases the potential for conflict. Hence, the wolf's re-immigration to Denmark has sparked considerable debate. As the wolf is native to Denmark the state is legally obliged to protect and facilitate its recolonization. The potential for conflict leading to the kinds of illegal action that could affect wolf conservation must therefore be explored. This can be done using an ex-ante investigation, which allows us to address potential conflicts, before they take place.

Specifically, the question we address in this paper is which measures Danish landowners who encounter wolves on their property will undertake, including both legal and illegal measures. In order to reduce the sensitivity of the issue, we use an anonymous questionnaire and a choice experiment where landowners are asked to choose between combinations of illegal and legal actions in a statistical design, enabling inference of preferences among alternatives, without forcing them to reveal directly preferences for illegal responses to the presence of wolves on their land.

The wolf returns to Denmark

The return of wolves to Denmark is mainly attributed to the general expansion and increase in distribution of wolf populations across Europe [6, 7].

The number of wolves in Denmark is currently disputed. The Danish Centre for Environment and Energy reported the presence of 23 individual wolves in Denmark in 2015 [8]. However, this number has been questioned subsequent to this study and the actual number may be as low as 5 individuals [9]. As a result the Danish Centre for Environment and Energy has begun work to validate the DNA-results on which the number is based [10]. Based on the availability of prey, suitable habitats and mortality factors, Jutland may sustain a population of 10 wolf packs and some additional roaming individuals [11]. With an increasing abundance of several deer species in Denmark [11], hunters are important in regulating deer populations.

Historically, livestock depredations and fear were the main drivers of extirpation of the wolf in Western Europe, including Denmark [12]. The wolf has been protected under the Bern Convention since 1979 and the Habitats Directive since 1992 [8]. It therefore returns to Denmark as a protected species that is illegal to hunt or capture. The penalty for doing so includes fines and prison up to two years. In order to accommodate

the wolf as a protected species, and to mitigate potential conflicts that may arise between humans and wolves, a management plan was prepared by the Danish Wildlife Management Council for the Department for the Environment [11]. In collaboration with the Danish Centre for Environment and Energy, Aarhus University, and Forest and Landscape Denmark, University of Copenhagen, a committee was set up to draft the plan. Additional collaborators to the plan included most of the major green organizations.[1]

The wolf management plan provides compensation for livestock (incl. sheep, goats, cattle, and horses), verified to have been killed by a wolf, and the opportunity to acquire subsidized fences built specifically to keep out wolves. The management plan is "dynamic", meaning it can be adjusted in response to increased experience, e.g. from specific conflicts (The Danish Nature Agency, pers. comm.). However, the management plan does not specify a range, maximum number, or density, of wolves as an aim for the plan. It does, however, state that individual wolves causing problems may be subject to derogation from protection.

Wildlife crime

Wildlife crime as a specific subfield of green criminology has emerged as a response to human wildlife conflicts e.g. the persecution of predators. It focuses on illegal actions against wildlife [13] and investigates these crimes in terms of harm, inequality, suffering and pain [4] on the one hand, and as cultural reactions by people who perceive their ways of life to be under threat as a result of wildlife conservation. Drivers of these crimes may include the perception of wildlife as natural resources exploitable to humans (i.e. anthropocentrism) and intolerance and prejudice against wildlife based on human superiority (i.e. speciesism) [4]. Thus, within the framework of green criminology, a core point of human-wildlife conflicts is that humans exert power over non-human animals, often with little regard for the intrinsic value of wildlife. Furthermore, environmental laws are often shaped in the favor of human benefits [14]. Sollund [4] describes that many cases of wildlife crime in a Norwegian court were anthropocentrically based, with lenient punishments focused on biodiversity conservation objectives, rather than on violating the intrinsic rights of the animals. She moves on to stress that the image of predators as enemies of hunters, farmers and wildlife, is maintained through these laws when violations are treated by the authorities as misdemeanors rather than serious crimes.

Negative attitudes towards predators have been found primarily among livestock keepers, hunters, and residents in areas with predators [2, 15]. These stakeholders regard predators as a threat to their way of life, including economic interests, personal safety, the safety of pets and hunting dogs, as well as competitors for game [2].

Here we use a method relying on random utility theory i.e. based on economic theory which takes an anthropocentric perspective. We do so by looking at how landowners perceive the problem of wolves. We also identify opinions that reflect speciesism and anthropocentric ethics on the part of respondents.

[1] The Danish Hunters' Association, The Danish Society for the Nature Conservation, The Danish Agriculture and Food Council, The Danish Forest Association, the Danish Ornithological Society, the Danish Outdoor Council, and the Society for the Prevention of Cruelty to Animals.

Potential reasons for conflicts between wolves and humans

Although the presence of wolves in Jutland can be attributed to successful conservation efforts, people living in rural areas where wolves are establishing themselves, may not appreciate its re-immigration, due to the potential conflicts that may arise from coexistence [7]. In the following, these potential conflicts will be presented in four main categories as incentivized by perceptions of wolves as; 1) a negative economic impact through predation on livestock and the cost of preventative measures; 2) a competitor to hunters affecting the abundance of game and hunting yield; 3) fear for the safety of people and pets; and 4) as a symbol of the divide between rural and urban communities. We use these groupings to characterize respondents, and explain their choice of actions in response to the presence of wolves on their land. The reasoning for these groupings are described below.

Economic consequence

Historically, depredations of livestock have been the primary driver for exterminating the wolf [12]. Today, wolves are still portrayed as likely to attack free ranging livestock. Landowners may therefore fear for the negative economic impact that their presence may entail through injuring and killing livestock. As wolves are opportunistic in choice of prey, livestock may be killed, especially if left unprotected [4, 11, 16] and occurance of this has been documented through DNA-analyses in Denmark [17]. However, livestock killings may be exaggerated. In Denmark, wolves have been accused of several livestock killings, which DNA-tests proved to be committed by dogs. In general, sheep and goats are more vulnerable to attacks than cattle and horses and repeated attacks may occur where protective measures are not in place. For the individual farmer the consequences can be severe, thus giving rise to an economically founded conflict.

Landowners may furthermore experience economic consequences through having to reduce hunting lease prices. This may occur if the presence of wolves depresses wildlife stocks or causes high value game or trophy species to move out of specific hunting areas reducing the value of hunting in these areas.

The wolf as a competitor

Following from the above hunters may perceive wolves as competitors for game species (e.g. red deer and roe deer) [18], and may therefore believe that wolves will reduce or impair hunting yield and the hunting experience in general that can be very costly due to high prices of hunting leases.

Fear of the wolf

Throughout European history, fear of wolves has been widespread [19]. Although this may partly be the result of a legacy of supernatural conceptions, some concern is justified and has been a driver of persecution of wolves throughout history [12]. To this day, people express fear for their personal safety and particularly that of children [19]. They may also be concerned about the safety of pets such as dogs and cats in areas where wolves are settling. Linnell et al. [19] identified main factors associated with wolf

attacks on humans as involving rabies (cause of the majority of wolf attacks on people), habituation (where wolves lose their fear of humans), and situations where wolves are provoked by people entering a wolf den with pups or trying to kill a trapped or cornered animal.

Denmark and Germany are declared free of rabies and it appears that wolves so far have retained their natural fear and general shyness toward people. The Danish Nature Agency therefore, based on experience from other countries, considers attacks on humans in Denmark unlikely [11]. However, the availability of human waste, such as trash, dead livestock or remains from hunting kills may attract wolves and thus increase the risk of habituation.

Most attacks on dogs in Scandinavia occur during hunting of bear or moose, where the dogs typically roam far away from the hunter. Such attacks are unlikely to occur in Denmark where this type of hunting is not practiced in contrast to Sweden and Norway [11]. In addition, humans are not regarded as prey by wolves and direct attacks on humans are very rare. In the period between 1950 and 2000, only four attacks on people by wolves not infected by rabies have been documented in Europe, four in Russia and one in North America [19].

Rural vs. urban communities

Wolves have been considered a symbol of urban communities' dominance over rural communities [20], but also between local governance and the EU directives and legislation [2]. This is shown throughout Europe, where the human-predator conflict has come to concern the management of predators rather than the actual consequences of predator presence [3, 21–23]. In the United States and Europe, pro-wolf attitudes in urban communities are perceived as forcing the re-establishment of wolf populations on rural communities, leading to local opposition. Accordingly, Bjerke and Kaltenborn [24] find that the attitudes towards wolves among the rural communities in Eastern Norway are significantly more negative compared to urban communities. Rural inhabitants in wolf areas also claim that their quality of life had decreased as a result of the re-establishment of wolves and that problems related to wolf presence are not acknowledged by authorities and underestimated by urban communities.

Based on the current media debate it seems that wolf management is perceived similarly by some groups in rural communities in Denmark. And there are even people claiming that wolves were actively transported to and released in Denmark and that this entails a conspiracy. In Sweden, Hagstedt and Korsell [2] document a similar pattern, as 56% of the respondents to their survey believe that wolves were secretly reintroduced. Thus, the presence of wolves may widen the existing divide between rural and urban communities in Denmark.

Potential responses towards the presence of wolves on the property

Legal actions in response to the presence of wolves on the property may include construction of fences or the acquisition of guard dogs. It may also entail feeding game species on the land to compensate for individuals lost to wolves, as well as establishing systematic patrols on the property, and installing monitoring devices such as camera traps. Finally, it may also include lowering the price of hunting leases in order to

compensate for a decrease in hunting yield. These actions are non-sensitive and represent initiatives that indicate acceptance, or adaptation, to the wolves' presence on the property.

However, actions taken in response to wolf presence may also include attempting to shoot, poison or trap the wolves, as well as attempting to scare them away e.g. by using light and sound. These represent illegal actions, due to the status of the wolf as a protected species that landowners might undertake, to remove the wolves from the property. In a critical criminological perspective, of course, there is a sense in which some illegal activities merely represent the continuity of lifestyle practices now criminalized in the face of new global agendas of biodiversity [25].

Data and methods

Study area

The peninsula of Jutland (29,777 km^2) comprises more than 2/3 of the overall area of Denmark. More than 2.5 million people reside in Jutland with a population density of 72.78 people/km^2. The most densely populated areas are Eastern and Southern Jutland [26]. The general land use in Denmark is distributed as 66% agriculture, 16% forests and heathland, 10% cities and infrastructure, and 7% lakes, meadows and bogs [27]. The distribution is similar in Jutland, and appears mainly as fragmented patches of nature and forest within a predominantly agricultural landscape. Jutland is experiencing an influx of wolves from Northern Germany [11]. As long as there is enough available prey and suitable territories and habitats in Jutland, it is considered unlikely that wolves will migrate to any of the surrounding islands [11].

Data collection

In our study, a questionnaire was conducted among 1500 randomly selected landowners in Jutland, from October to November 2014. Landowners were selected from the Danish Central Business Register including crop and livestock farms as well as forest properties. Hunting takes place on most properties either by the owner or by people who rent it, and there is a well-developed hunting lease market [28].

Invitations to answer an online questionnaire were sent by personal letters to the landowners in October, thus, avoiding periods of intense agricultural activity and associated implications for the response rate. A lottery was incorporated in which participants were offered a chance to win a gift certificate to be used in various general goods stores, as an incitement to participate in the survey. This has been shown to increase the response rate [29].

The main objectives of the questionnaire were to assess landowners' attitudes towards wolves, the determinants of these in relation to the four groupings presented in the introduction, and to establish the representativeness of the sample in terms of sociodemographic characteristics. Furthermore, they were asked to make a set of choices between different bundles of actions in a so called *choice experiment,* thereby allowing for estimation of the relative preferences of different actions.

Choice experiment design

Choice experiments, is a stated preference method, used for examining preferences in choices that are difficult to measure [30]. It has a great potential for evaluating the likelihood and determinants of behavior that is sensitive or controversial [31], if care is taken to avoid hypothetical bias. Respondents are typically asked to choose between different bundles of goods, described in terms of their attributes (in our case actions), and the levels that these take [32], enabling analysis of the trade-offs between the attributes.

The approach is based on Random Utility Theory [33], where it is assumed that the individual chooses an action over an alternative so as to maximize utility. It also builds on Lancaster's Theory of Value [34, 35], which states that individuals gain utility, not from the goods themselves, but from the characteristics they take. Further descriptions of these methods are given in Hensher et al. [36] and Train [35].

The choice experiment was designed to uncover if people might respond to the presence of wolves with illegal actions. The design was inspired by methods, such as the Randomized Response Technique [37, 38], and the Unmatched Count Technique [37], developed specifically for working with sensitive questions, such as poaching. Thus, in the choice experiment, respondents were presented with a hypothetical scenario, where a wolf pack has begun roaming their properties as part of its territory, and they were asked how they would respond, selecting between three bundles each containing three individual actions. In total nine different actions were possible, three sensitive- and six non-sensitive actions. The exact formulation of the actions that landowners could choose to carry out is described in Table 1.

Focus was on methods previously used to persecute large carnivores include shooting, trapping or intentionally disturbing them [39, 40].

As a part of hunting practices in Denmark it is legal to shoot and trap certain animals at certain times. Therefore, it was determined that the most likely means of persecuting wolves would be by trying to shoot or trap them, rather than using poison, which is also

Table 1 Shows the six non-sensitive actions, as well as the three sensitive actions, available in the choice experiment, including the wording presented to the respondents

Non-Sensitive actions
Wording
I will feed the wildlife on the property to compensate for wildlife lost to wolves
I will lower the price of renting out hunting, to compensate for a decrease in hunting yield
I will install camera traps to establish where the wolves are, in order to monitor them
I will fence parts or the entire property to keep out the wolves
I will acquire dogs (guard dogs/herding dogs) to protect the property and the livestock, and to feel more safe
I will establish systematic patrolling of the property to disturb the wolves from settling in
Sensitive actions
Wording
I will attempt to shoot the wolves
I will put out traps in an attempt to eliminate the wolves from my property
I will attempt to scare the wolves away, e.g. using light and sound

difficult to obtain. We assume also that the likely outcome for an illegally trapped wolf would be to get shot. The act of scaring away wolves that have settled on or close to a property is less sensitive, but it is still illegal to deliberately use sources of disturbance to this end for other listed species cf. the Danish nature protection act §29a. Hence the action of using lighting or loud noises to ward off wolves was selected as an attribute.

Combining all the potential actions into bundles of 3 would result in 9^3 possible combinations. This was reduced to the minimal design where main effects can still be estimated. To do so, we used the software Ngene v.1.1.2 to create an efficient design with 18 pairwise comparisons in two blocks, so that each respondent was presented with 9 independent choice sets. Furthermore, a "no action" option was included in each choice set, to allow the respondents not to choose any of the suggested actions. This design was selected because some choice sets contain more sensitive (illegal) actions than others and in order not to force respondents to choose illegal actions. An example of a choice card is shown in Fig. 1.

Analysis of choice experiment data

The results were analyzed using the statistical software NLOGIT 5 and initially estimated using a conditional logit model [35], in which the probability of choosing an alternative over another is estimated based on the actions of the alternative. To enable modelling heterogeneity explicitly, we used a latent class discrete model [35], in which respondents are divided into a number of classes, and the probability of belonging to each of these classes is estimated simultaneously with the preference structure. It is a standard tool applied within discrete choice analysis [41, 42]. It is furthermore possible to include explanatory variables for this class probability membership. However, there may be a risk of endogeneity if these are based on questions about opinions related to the same issues as the actions taken. Consequently, we analyzed class characteristics ex post, based on an estimation of the *individual* class

Of the three groups, tick the one that you think, contains the most actions you would undertake, in order to achieve the best result for you, if you discovered that a wolf pack had started to use your property as part of its territory. That is, if one group contains actions you find irrelevant, you must consider if the remaining actions in the group, collectively make up for this, before choosing another group. If none of the actions in all the groups represents actions you would undertake, tick "none of them".

Tick one only

❑ **Group 1**

I will lower the price of renting out hunting, to compensate for a decrease in hunting yield
I will attempt to shoot the wolves
I will acquire dogs (guard dogs/herding dogs) to protect the property and the livestock, and to feel more safe

❑ **Group 2**

I will feed the wildlife on the property to compensate for wildlife lost to wolves
I will acquire dogs (guard dogs/herding dogs) to protect the property and the livestock, and to feel more safe
I will establish systematic patrolling of the property to disturb the wolves from settling in

❑ **Group 3**

I will attempt to shoot the wolves
I will fence parts or the entire property to keep out the wolves
I will establish systematic patrolling of the property to disturb the wolves from settling in

❑ **None of them ("no action")**

Fig. 1 An example of the choice card. Each respondent received 9 of these. Notice, that the responses to the presence of wolves will differ between the choice sets

probability membership, and then calculated the weighted answers to certain questions used as proxies for the reasons explaining attitudes towards wolves as described earlier.

Results

Of the contacted landowners 574 (38%) completed the survey and an additional 83 (6%) completed it partly. An initial invitation resulted in approximately 55% of the responses and a reminder, which was sent out two weeks after the first, provided the remaining 45% of the responses. Five hundred eighty individual responses were completed sufficiently to include in the analysis.

The representativeness of the sample was confirmed through comparison with the general characteristics of properties in Jutland. Property size of the sample mean was 67.81 ha compared to 70 ha for the average land property in Denmark. Sixty six percent of farms in Jutland have livestock but only 35% of respondents classified their properties as livestock farms. However, respondents classifying their properties as crop farms may still have livestock. Confirming this 56% of the respondents indicated that they had grazing livestock.

Twenty eight percent of the sample indicated that running the property was a full time occupation, compared to 72% indicating a part time occupation, suggesting other means of income. This corresponds to the general distribution of farm properties in Denmark, with a division of 30% full-time- and 70% part-time operations. It was not possible to establish the representativeness of the properties in terms of hunting as information on the number of properties with hunting in Denmark is not registered (The Danish Hunters' Association, pers. comm.).

In analyzing the opinions and attitudes of the respondents toward wolves, respondents were asked if they thought there should be more or fewer wolves in Denmark in the future, compared to the 11[2] individuals that had been verified in Jutland. Seventy one percent of the respondents believe that there should be much fewer wolves in Denmark in the future, indicating a general negative attitude toward their presence.

Results from the latent class model

A Latent class model dividing respondents into four segments was estimated. Four segments were selected based on the statistical criteria, Akaike's Information Criteria and Bayesian Information Criteria. However, the number of classes also had to be reasonable, i.e. distinct and not too small [43]. Thirty three percent of the respondents were assigned to segment 4 as the largest and 17% to segment 3 as the smallest (Table 2).

The statistical measure of model performance, pseudo-R^2 is 0.28, which is a fairly good fit behavioural economics. The action "I will lower the price of renting out hunting, to compensate for a decrease in hunting yield" was set as the baseline or reference action. Thus the coefficient of all other actions are calculated with reference to this and as can be seen the preference for most actions differ significantly from this.

[2] At the time of the execution of the survey, 11 individual wolves had been verified.

Table 2 Shows the results from the main (LC) model. Respondents are categorized in four segments based on the similarity in their preferred actions

Action	Segment 1		Segment 2		Segment 3		Segment 4	
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
None	**7.53344*****	1.09361	**5.52904*****	0.51100	**2.32343*****	0.42421	**1.88027*****	0.31291
Feed the wildlife	**0.94308****	0.42305	**-0.10230**	0.22465	**1.05304*****	0.17820	**0.25071****	0.10956
Install camera traps	**1.49503*****	0.40963	**0.85192*****	0.22746	**1.23168*****	0.16805	**1.46169*****	0.11702
Shoot the wolf	**2.17242*****	0.48928	**4.59687*****	0.27000	**-0.44813****	0.22282	**2.94054*****	0.16203
Trap the wolf	**1.04834****	0.47839	**2.39787*****	0.21214	**0.23849**	0.19229	**1.54713*****	0.13314
Scare the wolf away	**1.66493*****	0.40797	**1.70301*****	0.21160	**0.82664*****	0.19847	**1.69117*****	0.12160
Put up fences	**0.33075**	0.43398	**0.68727*****	0.20074	**0.93563*****	0.18709	**1.23622*****	0.10983
Acquire dogs	**1.69969*****	0.46480	**0.84085*****	0.25669	**0.50133*****	0.18146	**1.23566*****	0.12779
Patrol the property	**1.99768*****	0.43221	**1.74045*****	0.20374	**0.78019*****	0.16190	**1.45239*****	0.10454
Segment 1 prob.	0.24							
Segment 2 prob.	0.22							
Segment 3 prob.	0.17							
Segment 4 prob.	0.38							
McFadden Pseudo R-squared	0.2847							
Log likelihood function	-5176.2818							
Restricted log likelihood	-7236.4566							
Inf.Cr.AIC	10,430.6							

***. **. * Significance at 1%. 5%. 10% level

Segment 1 is characterized by preference for not taking any action. However, if respondents in this segment choose to act, their preferred action is to shoot the wolves closely followed by patrolling to ward them off.

Segment 2, is also characterized by an overall preference for not taking any action. However, there is an almost equally high preference for attempting to shoot the wolves. In addition, other sensitive actions such as trapping the wolves or attempting to scare them away are preferred over non-sensitive actions, with the exception of conducting patrols.

Segment 3, represents a segment of respondents who appear to prefer not taking any action at all, which explains the relatively low coefficients. Not taking action has the highest coefficient, indicating that it is the most preferred. Sensitive actions also have lower coefficients, than non-sensitive actions. This indicates that this segment is characterized by respondents who prefer to not undertake illegal actions against the wolves, particularly trying to shoot or trap them. This is underlined by the negative coefficient for attempting to shoot wolves, which indicates that respondents belonging to this segment will more likely lower the hunting lease than shoot wolves.

Segment 4, is characterized by a higher preference for shooting wolves than for not taking any action. Aside from the attribute "not taking any action", this segment is characterized by high coefficients for sensitive compared to non-sensitive actions, which indicates that these respondents prefer to try to shoot, trap or scare away the wolves, over any other action.

Explaining the heterogeneity of the segments

Having outlined the segments, we examined the demographic, socioeconomic and attitudinal variables that may explain individuals' segment affiliation (class probability membership function) focusing on segments 2 and 4 as these exhibited the highest preference for sensitive actions including illegal lethal actions.

Most socioeconomic factors did not explain the observed heterogeneity in the segments, as the weighted averages of the different socioeconomic variables are approximately similar across all four segments (Table 3). The exception is individuals owning larger properties and individuals who perceive the presence of the wolves as having negative economic consequences that both tend to be more affiliated with segments 2 and 4. Examining the perception questions, individuals in segments 2 and 4 are also more likely to believe that the presence of the wolves will reduce hunting yield, and individuals who hope that hunting of wolves may be legalized in the future. In addition, segments 2 and 4 are characterized by individuals who think that wolves will become less shy over time and fear that they will pose a safety risk for humans. Finally, these segments are characterized by individuals with low faith in authorities (i.e. who disagree that authorities will offer sufficient support in wolf conflicts), and a higher likelihood of stating that there should be fewer wolves in Denmark in the future, as compared to respondents affiliated with segments 1 and 3.

Overall it appears that segments 2 and 4, having the highest preferences for illegal lethal actions, are characterized by having the most negative attitudes toward the wolves, which appears to be founded in perceived negative economic consequences, competition between hunters and wolves for hunted game, fear of wolves as a threat to humans and pets as well as a general negative attitude towards authorities responsible

Table 3 Shows the weighted average of variables based on the four categories 'Economic consequence (economy)', 'the wolf as a competitor (Competition)', 'fear of the wolf (Fear)', and 'Rural vs. urban communities'. Additionally, it shows the weighted averages for the variables size of land, the perceived realism of having wolves in the property, and the preference for less wolves in the future in Denmark.

Weighted average of variables based on the four categories	Segment 1	Segment 2	Segment 3	Segment 4
Size of land (ha)	60.47	73.65	62.55	70.54
Economy				
Wolves = negative economic impact	0.28	0.55	0.31	0.55
Competition				
Wolves impair hunting yield	0.62	0.80	0.60	0.81
Legalization of wolf hunting	0.52	0.76	0.50	0.79
Fear				
Wolves pose a risk for humans	0.19	0.52	0.25	0.52
Wolves become less shy over time	0.38	0.74	0.44	0.73
Rural vs. Urban communities				
Faith in authorities	0.26	0.12	0.29	0.13
Attitudinal				
Realism of wolves on the property	0.33	0.43	0.43	0.47
Less wolves in the future	0.65	0.94	0.56	0.93

for wolf management. Hence, none of the categories alone explain affiliation with these two segments. Rather, it seems that the preference for undertaking illegal actions is based in a mix of them all.

Discussion

Conservation is about accommodating the requirements of wildlife and the requirements, and expectations of humans [44]. This can be difficult when a species is in direct conflict with human interests. It may be even harder when enduring negative conceptions underlie objections toward conservation, *per se* as in the case of wolves [44].

The results from the present study reflect that the wolf, generally, is regarded as an unwelcome guest in Denmark, by the landowners in Jutland. The majority of respondents express a preference for fewer wolves in Denmark in the future (80%), as compared to the current low number of animals.

Negative economic consequences

The results reveal that the negative attitudes and preference for lethal actions are rooted in particular in perceived negative economic consequences. Respondents believed that wolves feed more on sheep and goats (63% of the whole sample) than on free roaming species such as deer (51% of the whole sample). Attacks on livestock have occurred in Jutland and, these results indicate that a concern about wolves killing additional livestock leading to a financial loss is prevalent.

The wolf as a competitor

As a political interest group, the Danish Hunter's Association is an important stakeholder in nature and wildlife management in Denmark. Due to the high cost of hunting and its cultural significance, hunters may perceive wolves as competitors for game [18]. Seventy five percent of the respondents reported that they were hunting and/or renting out their land for hunting. The results indicate that respondents believe that wolves will reduce hunting yield on the property. This represents a highly anthropocentric perspective on wolves as laying claim to natural resources that belong to humans and hunters in particular [2, 4]. The notion of stewardship of wildlife by paternalistic hunters has been found to be strong among Scandinavian hunters in particular [45]. Furthermore, there is a general hope that hunting of wolves will be legalized in the future, which may be interpreted as representing a compromise for the hunters, allowing for the exertion of dominion over the wolves reflecting either a perspective oriented towards speciesism, or the reclamation of stewardship of local fauna on the part of hunters in the face of a global biodiversity conservation agenda. Dressel et al. [15] suggest that the bear may be regarded more positively than wolves across Europe, because it, in some countries, is a huntable species, thus imparting value onto it. In accordance with this, allowing local hunters licensed hunting of wolves, has been shown to reduce conflict levels in Sweden [46]. Recent studies are however challenging this link, suggesting hunters may become more averse to wolves when a legal opening is presented, signaling that wolves have decreased in conservation value [47]. Furthermore, a complaint was filed to the EU by Swedish environmental groups, much like in Finland, with the claim that allowing hunting of individuals in such a small population is a violation of regulations [2], thus escalating a conflict between conservationists, the state and EU. Furthermore, it raises the question of the magnitude of the wolf population required to ensure sustainability. In addition, there is no evidence suggesting that licensed wolf hunting will alleviate illegal hunting [2] although it clearly will raise the value of resident wolves to the individual land owner.

Fear of the wolf

Although the literature shows that wolves only in rare instances attack humans [19], personal and family safety concerns continue to underlie a negative attitude toward wolves [48, 49].

After the wolf was extirpated from large parts of its historic range in Europe, it was confined to mountainous areas with low human population densities [50]. Therefore, people have adopted the view that wolves only belong in extreme wilderness and not in populated agricultural landscapes [12]. The results of the present study may reflect this perception. Indeed, the majority of respondents believe that the wolves pose a risk for humans and that it will lose its shyness towards people and move closer to human residences. Overall, this implies that respondents generally believe that there is no room for wolves in a country as densely populated as Denmark. This viewpoint may be interpreted as a narrowly speciesist viewpoint, insofar as it shows no apparent regard to the fact that wolves were a natural part of Danish nature before people even settled this part of the world.

Rural vs. urban communities

Wolves have been perceived as a symbol of urban dominance over rural communities [2, 20], and support for wolf conservation is typically strongest among urban residents, and weakest in areas where wolf populations are established [51]. Rural communities may perceive that urban based authorities force wolf restoration upon them [2, 20].

Confirming this notion, 77% of the respondents indicated that those best suited to make decisions regarding wolf management are people living in the areas, where wolves appear. These include mainly landowners (the respondents themselves), local residents in affected areas as well as the Danish Hunters' Association. The remaining 23% are comprised of groups like researchers, farming associations, politicians, the Danish Society for Nature Conservation, public servants, and the Danish Animal Welfare Society. This too is consistent with the findings of Skogen et al., [3] showing a reluctance to leave too much up to authorities, predator policies, scientific research, and animal welfare groups.

This reflects a widespread mistrust in authorities and particularly in terms of a general lack of faith in authorities in handling conflict situations (63%) between humans and wolves. Thus, there seems to be a divide between the rural communities and urban based authorities on the subject of wolf management, and the results can be interpreted as discontent among the rural communities, not necessarily toward wolves themselves, but against stakeholders that approve of establishing and maintaining viable wolf populations [3].

Explaining segment affiliation

The Latent Class Model shows that socioeconomic factors cannot explain segment affiliation. This may be explained by the questionnaire being directed toward a specific subset of the population, rather than the population as a whole. The attitude variables provide better explanation. The high preference for taking no action, and a low preference for the sensitive actions, defining segments 1 and 3, may be explained by two factors. Since the choice experiment is based on a hypothetical future scenario involving wolves establishing themselves on the property, individuals may not see this as a pressing issue, given the relatively limited current distribution of wolves in Jutland. Supporting this notion, the likelihood of wolves settling on landowners' properties within 5–10 years had no significance in explaining segment affiliation (Table 3). To further assess this, a spatial analysis was conducted comparing areas where wolf presence had been verified with areas where it had not. The results from this analysis showed no difference in preferred actions toward wolf presence on the properties. Thus, the preference for illegal actions appears not to be contingent on verified wolf presence in the relative local area, but rather on what the wolf symbolizes. Thus, it may reflect that people are trying to avoid a perceived likely costly conflict in advance of wolves establishing territories encompassing their properties in the future.

Interestingly, people in segments 2 and 4, have a lower preference for less sensitive and sanctioned means of controlling wolves (i.e. acquiring fences or guard dogs), than illegal lethal actions such as attempting to shoot or trap wolves, as well as other coercive methods such as scaring it away. Thus, the results indicate that these people

would rather take the risk involved in using illegal lethal actions before attempting less sensitive methods (however, see below).

This suggests resentment of wolves and unwillingness to accept and adapt to its presence, among the respondents. This attitude exists despite subsidies for mitigating measures such as fences. However, despite subsidies these measures will entail some form of financial losses, including the opportunity cost of the time spent seeking compensation and implementing the measures that are not compensated in existing schemes (constructing and maintaining fences) representing fear of economic costs as an explanation. Furthermore, people will have to seek these schemes as well as compensation for livestock depredation through the state, which tends to be complicated and can be compounded by the urban-rural divide described above.

Shooting the wolf, and the potential for bias

Although respondents indicate preferences for shooting, trapping, and scaring away the wolves, it is important to note that the present study cannot conclude whether they will actually commit the illegal acts or not. As the choice experiment is based on a hypothetical scenario, respondents relate to it as such. Hence, when stating the preferred actions, they are willing to undertake, respondents may exaggerate as a way to send a message. Rhetorically emphasizing or exaggerating the occurrence or likelihood of illegality to convey the urgency of resolving the wolf management situation has for example been indicated by von Essen and Allen [52] in Sweden. Although the choice experiment is designed to reduce strategic bias of respondents promoting a specific outcome through their answers, the presence of such bias cannot be ruled out.

Another important bias to consider is self-selection bias, whereby groups with specific interests, such as opposing the wolf management plan, become overrepresented in the sample through being more likely to respond to the questionnaire. Given the relatively high response rate there is some indication that the subject is attracting wide interest. Moreover, considering the overrepresentation of negative attitudes among respondents there may be some indication of self-selection bias. The lottery was introduced in the survey as a way to address this problem. However, it cannot be excluded that the sample is overrepresented by people with an inherently negative attitude toward the presence of wolves, which may affect the results in a specific direction. Conversely, it is also possible that actual preference for the sensitive actions is underestimated, as individuals may refrain from selecting choice bundles with these actions due to their illegal nature.

In addition, it should be noted that the four groups defined are not as clearly delimited as may be suggested. A hunter may for instance experience both competition, economic loss (reduced price of hunting lease), as well as the fear for own and dogs' safety.

Recommendations and future outlook

Due to the ex-ante nature of this paper, it may be difficult to assess actual compliance with Danish legislation in relation to wolf management. However, it is possible to illuminate tendencies, and thus, act upon them, in order to mitigate conflicts that may lead to illegal acts.

To avoid the situations that have caused illegal killing of wolves in other Scandinavian countries [5, 18, 53], it is important to address the negative conception of the

wolves, among landowners in rural areas of Jutland. This requires amongst others that the management plan is developed through an inclusive and transparent process [2]. The Danish Nature Agency accomplished this by including a wide range of stakeholders (incl. Danish Hunters' Association, the Danish Agriculture and Food Council and all major nature management NGO's) in drafting the management plan to ensure that these organizations accept the responsibility of working to mitigate conflicts between their members and wolves.

However, the results of this study also reveal that information campaigns must be developed to improve general knowledge about aspects of wolves' ecology, particularly in relation to feeding ecology and the fact that they rarely attack domestic animals and constitute little threat to people. To further demystify the predator, it may prove useful to transparently provide information about the movement of, and damages caused by, wolves. To this end, the Danish Nature Agency, has established a wolf hotline [11], and wolf interest groups post pictures of scat, tracks etc. on online fora.

The present study reflects that the negative conception of wolves may overshadow their physical presence and that this may be founded in anthropocentrism and speciesism. Indeed, as mentioned, verified wolf presence had no implication for the actions that the respondents prefer to undertake. Hunters' concern about competition should be less of an issue in Denmark than elsewhere considering that hunting is mainly conducted for the sportsmanship and nature experience rather than of necessity for subsistence. In fact, most Danish hunters express that one or more seasons with no kills has no effect on their interest in hunting [54]. The Danish Hunters' Association is an important player in nature conservation and should be sympathetic to the ecosystem function of wolves in contributing positively to natural selection of deer populations.

Means must found to promote an acceptance of the notion that humans and wolves can co-exist in the same areas as before. In Norway, designated zones that wolves may settle have been established [4]. Although wolves obviously have no conception of these man-made designated areas, those individuals that venture out of the zones risk being shot. In order to avoid a similar zoning system in Denmark, proactive measures such as investigating the maximum number of wolves that Jutland can sustain should be further investigated, with regards to the connectivity of larger patches of nature, suitable as habitat for wolves, and the availability of prey in those areas. In addition, the likely areas in Jutland that wolves will disperse to, as they expand in numbers, should be investigated, in order to establish if specific areas are more prone to human-wolf conflicts (e.g. dense populations of humans and livestock). In addition to the established compensation- and subsidizing schemes, the Danish Nature Agency has adopted a reactive approach to managing wolves, by stating that the management plan will be adjusted with gained experience. However, it may be worthwhile adopting a more proactive approach as described above. This will, to a greater extent, make it possible to anticipate specific conflicts. Initiatives are underway, such as the Danish Centre for Environment and Energy, Aarhus University, aiming to implement a project focusing on the likelihood and consequences of habituation (The Danish Nature Agency, pers. comm.) in order to address wolves' adaptability to different environments. In addition, Dressel et al., [15] found that the attitudes towards wolves become increasingly negative the longer people coexist with them. Longitudinal surveys should therefore be established to investigate changes in attitudes over time, in order to anticipate specific conflicts [15].

From the present study it appears that negative attitudes may be explained by the fact that wolves represent a part of nature that has been absent from the Danish landscape for centuries, and that people have grown accustomed to this convenience. Thus, the wolf may symbolize an invasive force, or a suitable enemy, interfering with a state of equilibrium, which is the product of its absence. It is reflective of a socio-political shift toward conservation that takes power away from the landowner. Furthermore, it seems that the presence of wolves is regarded as inconvenient. This may reflect a notion that it has been actively decided to have wolves in Denmark, and that it does not naturally belong, in turn, reflecting a speciesist view of the landscape that is predicated on a human-animal divide with strict parameters for co-existence, which the wolf is seen to regularly violate by straying into built environments. Supporting this interpretation, a small subset of the respondents, on their own accord, expressed the belief that the wolves in secrecy had been actively imported to Denmark, by so-called wolf lovers. Similar beliefs were reported in a Swedish survey [2]. However, this discussion may have been started mainly as a means to undermine the legitimacy of wolves as a native species to Denmark, and to affect policy development.

Examples of illegal lethal actions against wolves in Denmark have yet to emerge. However, it is important to consider how to enforce the relevant legislation. In wildlife crime, enforcement problems, such as lenient punishments or the selective enforcement by sympathetic officers, erode legislative regimes and undermines deterrence effects, indeed promoting further acceptance of illegality [4, 13]. Since the likelihood of detecting illegal killing of wildlife is limited, experience has shown that the punishment for violating wildlife laws should outweigh the benefits of committing violations [4]. Liberg et al. [18] concluded that as much as 50% of mortality of wolves in Norway and Sweden may be due to illegal killing, suggesting an inadequate deterrence effect of sanctions. This is further emphasized by the fact that out of 344 reported crimes, only 33 resulted in prosecution [2] reflecting anthropocentrism and speciesism among members of society toward wolves. These perspectives need to change if we truly want these large predators to re-establish in Denmark.

In conclusion, aside from posing a direct threat to the well-being of people, large carnivores may also pose an indirect threat as i.e. the economic and emotional losses associated with the killing of livestock or pets, or as competition for game affecting culturally significant and expensive hunting leases [55]. Thus, in order to maintain the current positive trends of large carnivores expanding in Europe, it is crucial to maintain a supportive public opinion, as "the underlying negative forces" of their former eradication may reemerge as a consequence of ecological, social, political, or economic changes [56].

Acknowledgements Jette Bredahl Jacobsen would like to acknowledge the Danish National Research Foundation for support to the Centre for Macroecology, Evolution and Climate.

References

1. Gangaas, K. E., Kaltenborn, B. P., & Andreassen, H. P. (2013). Geo-spatial aspects of acceptance of illegal hunting of large carnivores in Scandinavia. *PloS One, 8*(7), 1–9. doi:10.1371/journal.pone.0068849.

2. Hagstedt, J., & Korsell, L. (2012). Unlawful hunting of large carnivores in Sweden. In R. Ellefsen, R. Sollund, & G. Larsen (Eds.), *Eco-global crimes - Contemporary problems and future challenges* (pp. 209–233). New York: Ashgate Publishing Limited.
3. Skogen, K., Krange, O., & Figari, H. (2013). *Ulvekonflikter - En sociologisk studie* (1st ed.). Oslo: Akademika forlag.
4. Sollund, R. (2015). With or without a license to kill: human-predator conflicts and theriocide in Norway. In A. Brisman, N. South, & R. White (Eds.), *Environmental crime and social conflict: contemporary and emerging issues* (pp. 95–125). Farnham: Ashgate Publishing Limited.
5. von Essen, E., Hansen, H. P., Källström, H. N., Peterson, M. N., & Peterson, T. R. (2014). Deconstructing the poaching phenomenon: a review of typologies for understanding illegal hunting. *British Journal of Criminology, 54*(4), 632–651. doi:10.1093/bjc/azu022.
6. Deinet, S., Ieronymidou, C., Mcrae, L., Burfield, I. J., Foppen, R. P., Collen, B., & Böhm, M. (2013). *Wildlife comeback in Europe - The recovery of selected mammal and bird species*. Final report to Rewilding Europe by ZSL, BirdLife International and the European Bird Census Council. London: ZSL.
7. Skogen, K., & Krange, O. (2003). A wolf at the gate: the anti-carnivore alliance and the symbolic construction of community. *Sociologia Ruralis, 43*(3), 309–325. doi:10.1111/1467-9523.00247.
8. Jensen, T. S., Olsen, K., Sunde, P., Vedel-Smith, C., Madsen, A. B., & Andersen, L. W. (2015). Genindvandring af ulven (*Canis lupus*) i Danmark. *Flora Og Fauna, 121*, 48–54.
9. Statens Naturhistoriske Museum (2016). Der er formentlig kun få ulve i Danmark, vurderer forskere. http://snm.ku.dk/SNMnyheder/alle_nyheder/2016/2016.2/formentlig-kun-faa-ulve-i-danmark/. Retrieved 19 May 2016.
10. DCE - Nationalt center for miljø og energi (2016). Ulveovervågningen i Danmark - ny organisation og initiativer. http://dce.au.dk/aktuelt/nyheder/nyhed/artikel/ulveovervaagningen-i-danmark-ny-organisation-og-initiativer/. Retrieved 6 June 2016.
11. The Danish Nature Agency (2014). *Forvaltningsplan for ulv i Danmark*. http://svana.dk/media/207414/forvaltningsplan_ulv.pdf. Accessed 22 Nov 2014.
12. Mech, L. D., & Boitani, L. (2003). Introduction. In L. D. Mech & L. Boitani (Eds.), *Wolves - behavior, ecology and conservation* (1st ed., pp. 1–472). Chicago and London: The University of Chicago Press.
13. Nurse, A. (2011). Policing wildlife: perspectives on criminality in wildlife crime. *Papers from the British Criminology Conference, 11*, 38–53 Retrieved from https://eprints.mdx.ac.uk/id/eprint/11066.
14. White, R. (2013). The conceptual contours of green criminology. In R. Walters, D. S. Westerhuis, & T. Wyatt (Eds.), *Emerging issues in green criminology - exploring power, justice and harm* (1st ed., pp. 17–34). New York: Palgrave Macmillan.
15. Dressel, S., Sandström, C., & Ericsson, G. (2015). A meta-analysis of studies on attitudes toward bears and wolves across Europe 1976-2012. *Conservation Biology : The Journal of the Society for Conservation Biology, 29*(2), 565–574. doi:10.1111/cobi.12420.
16. Skonhoft, A. (2015). The Silence of the Lambs: Payment for Carnivore Conservation and Sheep Farming, Working Paper Series, Department of Economics, Norwegian University of Science and Technology. http://EconPapers.repec.org/RePEc:nst:samfok:16915. Accessed 14 Aug 2014.
17. Madsen, A. B., Elmeros, M., Andersen, L. W., Nørgaard, L. S., Mikkelsen, D. M. G., Sunde, P., et al. (2015). De første analyser af ulvens (*Canis lupus*) føde i Danmark. *Flora Og Fauna, 121*, 55–58.
18. Liberg, O., Chapron, G., Wabakken, P., Pedersen, H. C., Hobbs, N. T., & Sand, H. (2011). Shoot, shovel and shut up: cryptic poaching slows restoration of a large carnivore in Europe. *Proceedings of the Royal Biological Society, 279*(1730), 910–915. doi:10.1098/rspb.2011.1275.
19. Linnell, J. D. C., Andersen, R., Andersone, Ž., Balčiauskas, L., Blanco, J. C., Boitani, L., … Wabakken, P. (2002). *The fear of wolves: A review of wolf attacks on humans*. *NINA NIKU* (Vol. 731). Retrieved from http://www.nina.no/archive/nina/PppBasePdf/oppdragsmelding/731.pdf.
20. Ericsson, G., & Heberlein, T. a. (2003). Attitudes of hunters, locals, and the general public in Sweden now that the wolves are back. *Biological Conservation, 111*(2), 149–159. doi:10.1016/S0006-3207(02)00258-6.
21. Lundmark, C., & Matti, S. (2015). Exploring the prospects for deliberative practices as a conflict-reducing and legitimacy-enhancing tool: the case of Swedish carnivore management. *Wildlife Biology, 21*(3), 147–156.
22. Ghosal, S., Skogen, K., & Krishnan, S. (2015). Locating human-wildlife interactions: landscape constructions and responses to large carnivore conservation in India and Norway. *Conservation and Society, 13*(3), 265–274. doi:10.4103/0972-4923.170403.
23. Lüchtrath, A., & Schraml, U. (2015). The missing lynx: understanding hunters' opposition to large carnivores. *Wildlife Biology, 21*(2), 110–119. doi:10.2981/wlb.00068.

24. Bjerke, T., & Kaltenborn, B. P. (2000). *Holdninger til ulv. En undersøkelse i Hedmark, Østfold, Oslo og Akershus.* Trondheim.
25. Brisman, A., & South, N. (2012). A green-cultural criminology: an exploratory outline. *Crime, Media, Culture, 9*(2), 115–135. doi:10.1177/1741659012467026.
26. Statistics Denmark (2015a). Folketal. http://www.dst.dk/da/Statistik/emner/befolkning-og-befolkningsfremskrivning/folketal.aspx. Retrieved 11 Feb 2015.
27. Statistics Denmark (2015b). Landuse in Denmark. http://www.dst.dk/da/Statistik/emner/areal/arealanvendelse.aspx. Retrieved 11 February 2015.
28. Lundhede, T. H., Jacobsen, J. B., & Thorsen, B. J. (2015). A hedonic analysis of the complex hunting experience. *Journal of Forest Economics, 21*(2), 51–66. doi:10.1016/j.jfe.2015.01.001.
29. Heerwegh, D. (2006). An investigation of the effect of lotteries on web survey response rates. *Field Methods, 18*(2), 205–220. doi:10.1177/1525822X05285781.
30. Bateman, I. J., Carson, R. T., Day, B., Hanemann, M., Hanley, N., Hett, T., et al. (2002). *Economic valuation with stated preference techniques - a manual*. Cheltenham and Northampton: Edward Elgar.
31. Nielsen, M. R., Jacobsen, J. B., & Thorsen, B. J. (2013). Factors determining the choice of hunting and trading bushmeat in the Kilombero Valley, Tanzania. *Conservation Biology, 28*(2), 382–391. doi:10.1111/cobi.12197.
32. Hanley, N., Wright, R. E., & Adamowicz, V. (1998). Using choice experiments to value the environment - design issues, current experience and future prospects. *Environmental and Resource Economics, 11*(3–4), 413–428.
33. McFadden, D. (1974). Conditional logit analysis of qualitative choice behavior. In P. Zarembka (Ed.), *Frontiers in econometrics* (pp. 105–142). New York: Berkeley, CA: Academic Press.
34. Lancaster, K. J. (1966). A new approach to consumer theory. *The Journal of Political Economy, 74*(2), 132–157.
35. Train, K. E. (2009). *Discrete choice methods with simulation* (2nd ed.). Cambridge: Cambridge University Press.
36. Hensher, D. A., Rose, J. M., & Greene, W. H. (2005). *Applied choice analysis: a primer*. Cambridge: Cambridge University Press.
37. Nuno, A., & St. John, F. A. V. (2014). How to ask sensitive questions in conservation: a review of specialised questioning techniques. *Biological Conservation*, 1–11. doi:10.1016/j.biocon.2014.09.047.
38. St. John, F. A. V., Edwards-Jones, G., Gibbons, J. M., & Jones, J. P. G. (2010). Testing novel methods for assessing rule breaking in conservation. *Biological Conservation, 143*(4), 1025–1030. doi:10.1016/j.biocon.2010.01.018.
39. Linnell, J. D. C., Nilsen, E. B., Lande, U. S., Herfindal, I., Odden, J., Skogen, K., … Breitenmoser, U. (2005). Zoning as a means of mitigating conflicts with large carnivores: Principles and reality. In R. Woodroffe, S. Thirgood, & A. Rabinowitz (Eds.), *People and wildlife, conflict or co-existence* (pp. 162–175). Cambridge: Cambridge University Press.
40. Ripple, W. J., Estes, J. A., Beschta, R. L., Wilmers, C. C., Ritchie, E. G., Hebblewhite, M., et al. (2014). Status and ecological effects of the World's largest carnivores. *Science, 343*(6167), 151–162. doi:10.1126/science.1241484.
41. Jacobsen, J. B., Lundhede, T. H., & Thorsen, B. J. (2012). Valuation of wildlife populations above survival. *Biodiversity and Conservation, 21*, 543–563. doi:10.1007/s10531-011-0200-3.
42. Varela, E., Jacobsen, J. B., & Soliño, M. (2014). Understanding the heterogeneity of social preferences for fire prevention management. *Ecological Economics, 106*, 91–104. doi:10.1016/j.ecolecon.2014.07.014.
43. Ruto, E., Garrod, G., & Scarpa, R. (2008). Valuing animal genetic resources: a choice modeling application to indigenous cattle in Kenya. *Agricultural Economics, 38*, 89–98. doi:10.1111/j.1574-0862.2007.00284.x.
44. Boitani, L. (2003). Wolf conservation and recovery. In L. D. Mech & L. Boitani (Eds.), *Wolves - behavior, ecology and conservation* (1st ed., pp. 317–341). Chicago and London: The University of Chicago Press.
45. Kaltenborn, B. P., Andersen, O., & Linnell, J. D. C. (2013). Predators, stewards, or sportsmen – how do Norwegian hunters perceive their role in carnivore management? *International Journal of Biodiversity Science, Ecosystem Services & Management, 9*(3), 239–248. doi:10.1080/21513732.2013.818060.
46. Heberlein, T. A., & Ericsson, G. (2008). Public atitudes and the future of wolves (*Canis lupus*) in Sweden. *Wildlife Biology, 14*(3), 391–394. doi:10.2981/0909-6396(2008)14[391:PAATFO]2.0.CO;2.
47. Chapron, G., & Treves, A. (2016). Blood does not buy goodwill: allowing culling increases poaching of a large carnivore. *Proceedings of the Royal Society of London B: Biological Sciences, 283*(1830).

48. Røskaft, E., Bjerke, T., Kaltenborn, B., Linnell, J. D., & Andersen, R. (2003). Patterns of self-reported fear towards large carnivores among the Norwegian public. *Evolution and Human Behavior, 24*(3), 184–198. doi:10.1016/S1090-5138(03)00011-4.
49. Røskaft, E., Händel, B., Bjerke, T., & Kaltenborn, B. P. (2007). Human attitudes towards large carnivores in Norway. *Wildlife Biology, 13*(2), 172–185. doi:10.2981/0909-6396(2007)13[172:HATLCI]2.0.CO;2.
50. Kaczensky, P., Chapron, G., von Arx, M., Huber, D., Andrén, H., & Linnell, J. D. C. (2012). *Status, management and distribution of large carnivores – bear, lynx, wolf & wolverine – in Europe - part 1.*
51. Naughton-Treves, L., Grossberg, R., & Treves, A. (2003). Paying for tolerance: rural citizens' attitudes toward wolf depredation and compensation. *Conservation Biology, 17*(6), 1500–1511.
52. von Essen, E., & Allen, M.P. 2015. Reconsidering illegal hunting as a crime of dissent: implication for justice and deliberative uptake. *Criminal Law & Philosophy* 1–16.
53. Swenson, J. E., & Andrén, H. (2005). A tale of two countries: large carnivore depredation and compensation schemes in Sweden and Norway. In R. Woodroffe, S. Thirgood, & A. Rabinowitz (Eds.*), People and Wildlife, Conflict or Co-Existence* (pp. 323–339). Cambridge: Cambridge University Press.
54. Hansen, H. P. (2000). *Jagt i danmark år 2000.* Roskilde Universitetscenter.
55. Treves, A., & Karanth, K. U. (2003). Human-carnivore conflict and perspectives on carnivore management worldwide. *Conservation Biology, 17*(6), 1491–1499.
56. Chapron, G., Kaczensky, P., Linnell, J. D. C., von Arx, M., Huber, D., Andrén, H., et al. (2014). Recovery of large carnivores in Europe's modern human-dominated landscapes. *Science, 346*(6216), 1517–1519.