

# BEST PRACTICE ACTIONS FOR WOLF CONSERVATION IN MEDITERRANEAN-TYPE AREAS



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## Action A.11

**Ex-ante survey on the knowledge level and attitudes towards  
wolf presence in Portugal**

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## Final Report

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## **I. Executive Summary**

The main goal of this study is to understand public attitudes toward wolves and wolf management, to gather information of the knowledge about the species and the fear towards it in the counties of Guarda and Castelo Branco (Central Portugal closer to the border with Spain), before and after a communication campaign is implemented. The general public, the livestock owners, the hunters, the media workers (from local and regional newspapers and radios) and the police officers (members of GNR/SEPNA) are the focus groups sampled in this study.

Overall, results show that among the general public there is some acceptance of wolves and receptiveness toward the implementation of preventive methods for wolf predation on livestock. Livestock owners are slightly negative toward the idea of a wolf population increase and most agree that government must pay them compensation for damage caused by wolves, regardless the usage of preventive methods. Most hunters are neutral toward the idea of hunting wolves, and most want wolves to exist in the region. Seeing the wolf as a competitor for game species is not an issue for surveyed hunters. Most media workers and police officers tend to have a moderately positive opinion toward wolves. However, a minority in both groups agree with wolf hunting and lethal control. These groups must be under the scope of a powerful information campaign about wolves, which will contribute towards the success of any wolf conservation project.

Knowledge is consistently low among all groups. In general, questions related to various biological aspects of the species and the size and the trend of the wolf population in Portugal are answered incorrectly or are not answered. The majority of people show a strong fear of the species. People tend to fear an elusive animal they cannot see. Low knowledge about wolves is associated with more fear. Results provide important clues on the contents for the information campaign, which should address specific issues for each interest group. It has to be designed in detail for each group, addressing the gaps of knowledge more directly targeted at reducing fear and consequently improving attitudes.

Gender is a strong variable affecting knowledge and fear about wolves among various groups and these variables indirectly affect attitudes. This study identifies the groups in which education efforts should be stronger for women or men.

Overall, opinions about wolves among the general public are close to neutral or slightly negative, but very similar and stable in the various regions of the study area and in different timeframes.

Results help defining the contents of the information campaign, which target groups should be the priority and which groups should be dealt with more specific management measures. In addition, it provides a baseline assessment of attitudes, knowledge and fear toward wolves before the information campaign and other management measures, thus allowing the detection of any change in these variables in 2016.

## **1. State of the Art**

This opinion pool focused on the counties of Guarda and Castelo Branco. In this region, the wolf population is highly unstable and endangered, integrating the isolated wolf nucleus South of the Douro River. In the last national survey only two packs were identified (Pimenta *et al.* 2005). Nevertheless, recent data suggest wolf is expanding in the region, with increasing wolf sightings and reports of damage on livestock.

The first opinion survey, conducted more than ten years ago, in 2002, aimed at understanding above all the attitudes, knowledge, and fear of the general public and of various interest groups toward wolves (Roque *et al.* 2005; Espirito-Santo 2007). In 2013 there is the need to reassess public opinions in the new scenario of the expected return of the wolf.

One important action of the MedWolf project is an information campaign addressing wolf conservation issues in this region, since most threats are related to human activities. Nevertheless, information campaigns need to be designed ad hoc, addressing specific targets and providing the adequate level of information. Data for tuning such actions are needed before they start. These will also be used for assessing the success of the campaign as they will represent the baseline knowledge. A baseline sample of attitudes and beliefs will also allow the identification of support and disagreement over management options, thus providing an assessment of their feasibility and future success.

## **2. Goal**

The main goal of this study is to understand public attitudes toward wolves and wolf management, to gather information of the knowledge about the species and the fear towards it in the project's area, before and after a communication campaign is implemented in Action E2 of the MedWolf project.

The results will provide a baseline assessment of public attitudes and beliefs in 2013 to be compared with data to be collected in 2016, in the final stage of the project.

Five groups of respondents were considered in this study: the general public, the livestock owners (livestock breeders), the hunters, the media workers (from local and regional newspapers and radios) and the police officers (members of GNR/SEPNA). Students were not sampled in this action since they will be the focus of an opinion poll to develop in Action E2, before and after the implementation of the Wolf Kit in schools of the project's area. Results from the students survey will be presented on the report of action E2 in 2014, and compared with the interest groups sampled here.

Differences in attitudes, knowledge and fear of wolves among interest groups were assessed. Detecting differences in attitudes and beliefs across space was not a major goal but an objective we thought would be interesting to explore. Results were compared between the northern and southern part of the study area, since there are differences in wolf densities and wolf damage to livestock between the two regions.

Another objective was to check for differences in current and past attitudes and beliefs in the project's area. Data collected in previous projects in the last decade, provided important information for this analysis. By using a similar methodology under the LIFE-COEX project in the region North of the Douro River in 2005, and South of the Douro River in 2001-2004, it is possible to compare data and provide managers with a human dimensions study of wolf management at a broader regional scale and a tool for developing, if necessary, different strategies for managing wolves. This report presents an analysis of attitudes, knowledge and fear of wolves in the study area and a comparison with data collected in 2001-2005. The obtained results were also compared with results from other regions in Portugal collected in other studies.

One last objective which would further contribute to the overall goal was to understand the relationship between attitudes, knowledge and fear of wolves and to identify the factors affecting them such as various socio-demographic factors, past experiences with wolves and interest in wolf management issues.

Finally, this study will also contribute to have a clear vision of attitudes and beliefs about wolves in the region which could help identify the issues and type of information to be used in the communication campaign.

A baseline assessment of attitudes and knowledge toward wolves and wolf management in a region allows an evaluation of the effect of any future communication and public awareness efforts. It will also provide an understanding of how attitudes and knowledge change in relation to changes in the biological population, number of livestock killed by wolves, number of eco-tourism and economic opportunities, changes in legislation relating to the wolf, and other social and economic conditions within a region.

A summarized list of objectives is presented here:

1. Assess public attitudes toward wolves and wolf management;
2. Assess knowledge about wolves;
3. Assess fear of the species;
4. Analyse the relationship between attitudes, knowledge and fear of wolves.
5. Identify the factors affecting attitudes, knowledge and fear of wolves;

6. Identify the issues and type of information to be used in the communication campaign;
7. Check for differences in attitudes, knowledge and fear of wolves among interest groups;
8. Check for differences in attitudes, knowledge and fear of wolves between the northern and southern parts of the study area;
9. Check for differences in attitudes toward wolves between the study area and other regions of Portugal sampled in other studies;
10. Check for differences in current and past attitudes toward wolves.

## **3. Methods**

### **3.1. Data Collection**

A quantitative survey through personal interviews was done using a semi-structured questionnaire with multiple choices and categorical scales of responses. The questionnaire was prepared and interviews held between January and August 2013 in the project area, addressing mainly local people and interest groups including hunters, livestock breeders, media workers and local authorities. Students will be interviewed later in the school year of 2013-2014, before and after implementing the Wolf-Kit. The results obtained with all these interviews will be compared with those to be obtained in action D6.

#### **3.1.1. Sampling Frame and Chance of Selection**

Fowler (2002) defines a sampling frame as "the set of people that has the chance to be selected, given the sampling approach that is chosen".

##### **3.1.1.1. General public**

A sample of 100 questionnaires was needed to fulfil the objectives of the project but a sample of 150 interviews was implemented in order to increase the quality of the sample and allow more reliable statistical analysis. Local residents were sampled randomly among the general public from selected villages in the study area.

For sampling the general public, residents 18 years of age or older were eligible to participate in the study. The study area consists of two counties – Guarda and Castelo Branco – and each county consists of several municipalities. Each of the 7 municipalities inside the study area contains many villages, or groups of villages, called parishes (total of 197 parishes). Each parish was classified as urban, semi-urban, semi-rural or rural according to the following criterion (Table 1).

Table 1 – Classification of parishes according to the number of residents.

Classification of the Parishes	Criterion for the classification
Rural	less than 500 residents in one village
Semi-rural	between 500 and 1000 residents in one village
Semi-urban	between 1001 and 2000 residents in one village
Urban	more than 2000 residents in one village

Residents from the large urban centres (Guarda) were omitted from the sampling frame, as well as residents from urban and semi-urban parishes. The number of completed questionnaires required for each municipality was calculated by taking the population numbers (18 years old or older) for the municipality multiplied by the percentage of the total population to obtain an overall sample size of 150 respondents in the study area.

Sheskin (1985) has identified five factors in the determination of the sample size of a survey: cost, time, geography, level of accuracy and subgroup analysis. Of these factors, the cost, the time and the geographic area were the prevailing factors in this study.

The following table (Table 2) shows the number of residents from the general public to be sampled in each municipality.

Table 2 – Number of residents from the general public to be sampled in each municipality.

County	Municipality	Habitants in rural and semi-rural parishes, 18 years old or older	Number of rural and semi-rural parishes	Sample
GUARDA	Almeida	3338	12	12
GUARDA	Figueira de Castelo Rodrigo	3604	11	13
GUARDA	Guarda	12057	36	43
GUARDA	Pinhel	5499	15	19
GUARDA	Sabugal	8560	28	30
CASTELO BRANCO	Idanha-a-Nova	5576	12	20
CASTELO BRANCO	Penamacor	3779	10	13
<b>Total numbers</b>		<b>42413</b>	<b>124</b>	<b>150</b>

### 3.1.1.2. Hunters and livestock breeders

Hunters and livestock owners were sampled in two ways: through the associations that represent these groups (who provided contacts and information on the best time and location to find them) (Fig. 1), and randomly when the interviewer found anyone from these during the interviews to the general public. The goal was to have a minimum of 50 interviews from each interest group.



### **3.1.1.3. Media workers**

The survey targeted the whole universe of media workers in the region. Contacts were made with all the local and regional newspapers and radios, in order to survey all journalists. So, all media workers had the same chance of selection, although not all of them return our calls or e-mails, or accept to answer the questionnaire.

### **3.1.1.4. Police officers**

Local enforcement authorities, designated “GNR/SEPNA”, are members of the GNR (National Republican Guard) with specific responsibilities on the protection of nature (SEPNA). All members of SEPNA in the study area had the same chance of selection since all of them were asked to fill the questionnaire. The goal was to have a minimum of 50 interviews.

## **3.1.2. Sampling Procedure**



Figure 1 – Interview to livestock owner.



Figure 2 – Interview to the general public.

Due to the large geographic area to cover and the small number of interviews required in many small villages (one or two interviews in most villages), the selection of the potential respondents followed a simple criterion. After arriving into the village the interviewer approached the first person she saw in the street (Fig. 2). Eligibility of the potential respondent was assessed, ensuring that the respondent was 18 years of age or older, and that he/she had lived in the village for more than one year. The questionnaire was then administered as a personal structured interview. The second respondent was selected using the 'next to pass rule', and so on. Interviews were done from Monday to Sunday, usually from 9

a.m. to 7 p.m. This temporal frame allowed the sampling of employed residents, housewives, unemployed or retired people, students, etc.

### **3.1.3. Questionnaire Design**

The questionnaire used in this study was the same as used in the study conducted in 2001-2004 in the region South of Douro River (which includes the area of the MedWolf Project) and in 2005 in the region North of Douro River (county of Vila Real) under the LIFE-COEX project. It was designed taking into account the attitudinal and belief (knowledge) items used in questionnaires from previous Human Dimension (HD) studies in other countries. The questionnaire consisted of five sections which attempted to address each of the four components of attitude – affective, cognitive, behavioural intention, and behaviour (Fishbein & Ajzen 1975):

1. attitudes toward wolves;
2. knowledge about wolves or a knowledge section made up of factual questions;
3. attitudes toward various management approaches;
4. personal experience with wolves and assessments of the importance of the issue to the respondent;
5. socio-demographic information about each respondent (e.g. gender, age, residence, occupation, education).

Regarding the affective component of attitude, there were questions designed to address attitudes toward wolves (Table 3). Knowledge (*i.e.*, the cognitive component of attitude) was addressed through several questions about the perceived size and trends of the wolf population, biological features, and livestock issues (Table 4). Table 5 outlines items used to focus on management issues regarding wolf-livestock conflicts and to obtain behavioural intention information from respondents (*i.e.* what do residents support and/or oppose in terms of wolf management and what should and should not be done in the future to manage the species).

According to Bath (1987) and Kellert (1986) some interest groups' attitudes toward wolves are correlated with the level of experiences they have had with wolves; therefore, one part of the questionnaire (Table 6) contained items to document some of those experiences. Considering the randomness of the sampling procedure, people who had an interest in this subject were as eligible to participate in the study as those who had no interest in wolves.

The quantitative interviews have the limitation of giving equal weight to all respondents. To partially address this issue, there were items about the respondent's interest in the wolf management issue (Table 6). Exploring whether differences exist in opinions among people who are really interested in the issue and those who are not, is presented in the results section.

Table 3 – Items on attitudes toward wolves used in the questionnaire for survey on attitudes and knowledge toward wolves and wolf management in the study area.

	ATTITUDES TOWARD WOLVES
A1	Which of the following best describes your opinion about wolves? <sup>1</sup>
A2	To have wolves in Portugal is: <sup>2</sup>
A3	It is important to maintain wolf populations in Portugal for future generations. <sup>3</sup>
A4	We should ensure that future generations have an abundant wolf population. <sup>3</sup>
A5	Whether or not I see a wolf, it is important to me that they exist in Portugal. <sup>3</sup>
A6	Wolves have a big impact on big game. <sup>3</sup>
A7	Wolves have a big impact on small game. <sup>3</sup>
A8	Wolves reduce populations of roe deer and wild boar to unacceptable levels. <sup>3</sup>
A9	It is unnecessary to have wolves in this municipality* because abundant populations of wolves already exist in other parts of Portugal. <sup>3</sup>
A10	It is unnecessary to have wolves in Portugal because abundant populations already exist in other European countries. <sup>3</sup>
A11	Wolves should be completely protected in Portugal. <sup>3</sup>
A12	Wolves should be allowed to be hunted in specific hunting seasons. <sup>3</sup>
A13	Wolves should be allowed to be hunted year round. <sup>3</sup>
A14	Wolves should be killed by all means including the use of snares and poison. <sup>3</sup>
A15	Wolves keep roe deer and wild boar populations in balance. <sup>3</sup>
A16	Having wolves may increase tourism in this region. <sup>3</sup>
A17	Wolves cause abundant damage to livestock. <sup>3</sup>
A18	In areas where wolves live in close proximity to humans, wolf attacks on humans are common. <sup>3</sup>
A19	In areas where wolves live near livestock, their primary food is livestock. <sup>3</sup>
A20	I would be afraid to hike in the woods if wolves were present. <sup>3</sup>
A21	I would be worried with my personal or my family's safety if wolves were present near my home. <sup>3</sup>
A22	Wolves have the right to exist as any other species. <sup>3</sup>
A23	In your opinion, which animal is most dangerous to humans? <sup>4</sup>

Notes: <sup>1</sup> Response set: (1) strongly dislike; (2) moderately dislike; (3) neither like or dislike; (4) moderately like; (5) strongly like.

<sup>2</sup> Response set: (1) very bad; (2) bad; (3) indifferent; (4) good; (3) very good.

<sup>3</sup> Response set: (1) strongly disagree; (2) moderately disagree; (3) no opinion; (4) moderately agree; (5) strongly agree.

<sup>4</sup> (a) wolf; (b) lynx; (c) wild boar; (d) feral dogs; (e) equally dangerous; (f) none are dangerous.

\* Refers to the municipality where the respondents live.

Table 4 – Knowledge items of the questionnaire used in the survey on attitudes and knowledge toward wolves and wolf management in the study area.

	<b>KNOWLEDGE ABOUT WOLVES</b>
B1	How many wolves do you believe currently exist in Portugal?
B2	Do you believe wolf numbers in Portugal are: increasing, decreasing, remaining the same.
B3	How many wolves do you believe currently exist in this municipality <sup>1</sup> ?
B4	Do you believe wolf numbers in this municipality <sup>1</sup> are: increasing, decreasing, remaining the same.
B5	How much does the average adult male wolf weigh in Portugal?
B6	There used to be wolves throughout this <sup>1</sup> entire municipality.
B7	Wolves are completely protected in Portugal.
B8	Is it generally true that only two members of a wolf pack breed in any one year?
B9	How many sheep and goats do you think were killed by wolves last year in this municipality <sup>1</sup> ?
B10	Wolves kill sheep and goats only if there is not enough wild game.
B11	How often is a wolf generally able to kill wild prey?
B12	What is the average pack size of wolves in Portugal?

<sup>1</sup> Refers to the municipality where the respondents live.

Table 5 - Items on attitudes toward wolf management and behavioural intention, used in the questionnaire for the survey on attitudes and knowledge toward wolves and wolf management in the study area.

	<b>MANAGEMENT ISSUES <sup>1</sup></b>
C1	I would agree with increasing wolf numbers in Portugal.
C2	If a wolf killed livestock, I would agree with killing that wolf.
C3	I would be willing to contribute money toward a compensation program for livestock owners for losses due to wolves.
C4	There are enough wolves in Portugal.
C5	Livestock owners should receive money for living in a zone where there are wolves instead of receiving compensation for losses that wolf causes.
C6	Livestock owners should receive compensation for damage caused by wolves only if they do use methods to prevent damage, for example, guard dogs.
C7	Livestock owners that lose livestock due to wolf attacks should be compensated.
C7a	I would like part of my taxes to be used toward paying compensation for damage caused by wolves.
C7b	The government should pay compensation to livestock owners who lose livestock to wolves.
C7c	Livestock owners should be required to buy insurance for protection against wolf attacks.
C7d	The government should pay for this insurance for livestock owners.
C7e	There should be authorized wolf hunts in this municipality*.
C7f	The government should help livestock owners to implement methods for preventing damage, for example, good guard dogs and fences.

Note: <sup>1</sup> Response set: (1) strongly disagree; (2) moderately disagree; (3) no opinion; (4) moderately agree; (5) strongly agree.

\* Refers to the municipality where the respondents live.

Table 6 - Items on the level of experience with wolves and importance of wolf management issues, used in the questionnaire for the survey on attitudes and knowledge toward wolves and wolf management in the study area.

	EXPERIENCES WITH WOLVES AND INTEREST ON WOLF MANAGEMENT ISSUES
D1	Have you ever seen a wolf in captivity?
D2	Have you ever seen a live wolf in the wild?
D3 <sup>1</sup>	When and where was the last time you saw wolves in the wild? How many wolves did you see?
D4 <sup>1</sup>	Do you know anyone who has seen wolves in the wild?
D5 <sup>1</sup>	When and where was the last time that wolves were seen in the wild? How many wolves were seen?
D6	On a scale from 1 to 10, how important is the issue of wolf management in Portugal to you personally?
D7	On a scale from 1 to 10, how important is it to you that you keep up to date with the issue of wolf management in Portugal?

<sup>1</sup> These questions were used not to measure attitudes or experiences with wolves, but to collect data for the monitoring of wolves in the region (Action A2).

At the end of the questionnaire there were several items designed to collect socio-demographic data from respondents. Williams *et al.* (2002) reported many studies where attitudes differ greatly with socio-demographic characteristics of respondents. This study provides insights on which (if any) of these factors tend to affect attitudes and knowledge about wolves in Portugal.

A copy of the questionnaire is provided in the Appendix. Most of the attitudinal and belief items had been tested and used before in HD studies on wolf management in Yellowstone National Park (Bath & Buchanan 1989), Poland (A. Bath unpubl. data), Spain (A. Bath unpubl. data), France (Bath 2000), and Croatia (Bath & Majic 2001). Only a few questions were removed from the original questionnaire since they were proved to be multicollinear in all studies conducted in Portugal, and consequently removed from the statistical analysis.

Previous studies had revealed high reliability estimates for the attitudinal scale, meaning that the attitudinal items when combined consistently were good measures of attitudes toward wolves (Bath 2000, Bath & Majic 2001). Since the questionnaire was used extensively in previous human dimension studies in Portugal, there was no need to conduct a pre-test.

### 3.1.4. Interview Process

Data was collected between February and June 2013 through personal structured interviews conducted by an experienced interviewer who has conducted this kind of studies since 2002. The interviewer was a female because these tend to be seen as less threatening

when approaching potential respondents thus being more likely to obtain a higher response rate (Fowler & Mangione 1990).

### **3.1.5. Data Screening and Preparation**

#### **3.1.5.1. Data accuracy**

Quality control and checking procedures were used during coding, data entry and data preparation for analysis. Some of the procedures suggested by Sheskin (1985) to ensure quality control and checking were conducted:

- to check survey data validity. A random sample of 10% of all questionnaires were checked for data entry errors and the few errors (around 1%) that were found were corrected before conducting any analysis;
- to examine the possible effects of nonresponse bias (the lower response rate, the greater the likelihood of nonresponse bias). Personal interviewing can yield a high response rate. In this study, refusal rates were of nearly 0%, which means that non-response bias is not an issue of concern in this study.

The method of screening for accuracy involved the examination of the descriptive statistics for the variables, as suggested by Tabachnick & Fidell (2001). The authors suggest checking if all the values are in range, if the means and standard deviations are reasonable, if the discrete variables have out-of-range numbers, and if the researcher has accurately programmed the codes for missing values. Quality control and checking procedures did not reveal any significant problems with the data.

#### **3.1.5.2. Univariate outliers**

The presence of univariate outliers was checked through descriptive statistics for all the variables included in the questionnaire. Only two cases among police officers were considered univariate outliers and these were excluded from analyses.

#### **3.1.5.3. Missing data**

Sheskin (1985) points out the importance of making decisions concerning item nonresponse, which occurs when respondents refuse to answer a question or do not know the answer. In those cases where there is no answer, the item was assigned a missing value (-1) and excluded from analysis. Tabachnick & Fidell (2001) state that the pattern of missing data is more important than the amount missing. In this study, the missing data appeared to occur

at random through the data matrix thus posing no serious problems. In this research the small amount of missing data is excluded from analysis.

#### **3.1.5.4. Data transformation**

In this study, the variables associated with attitudes toward wolves and wolf management were not transformed to obtain normal distributions. The reason for not normalizing the attitudinal data lies in the fact that for one third of the variables respondents consistently chose "disagree" or "agree" statements, and did not show a neutral position. This results in bimodal distributions in which transformation to a natural curve was not desirable. Bimodal distributions do not represent a major problem when running principal component analyses (PCA). As long as the PCA is used descriptively as a convenient way to summarize the relationships in a large set of observed variables, assumptions regarding the distributions of variables are not an issue (Tabachnick & Fidell 2001). Answers to item A23 were recoded and assigned new values: 1 (not the wolf), 2 (wolf among other animals) and 3 (the wolf). The objective was to change a nominal variable into an ordinal variable, thus creating a gradient of fear.

#### **3.1.5.5. Multivariate outliers**

Multivariate outliers are cases with an unusual combination of scores on two or more variables (Tabachnick & Fidell 2001). The statistic used to identify the multivariate outliers was the Mahalanobis distance (Tabachnick & Fidell 2001). This distance was evaluated for each case using the Chi-square distribution. Tabachnick & Fidell (2001) suggest a probability estimate for a case to be an outlier of  $p < .001$  for the Chi-square. None of the cases were identified as multivariate outliers or were excluded from analyses.

#### **3.1.5.6. Multicollinearity and singularity**

Multicollinearity and singularity occur when variables are, respectively, too highly correlated, or redundant, *i.e.*, one of the variables is a combination of two or more of the other variables (Tabachnick & Fidell 2001). When variables are multicollinear or singular, they contain redundant information and they are not all needed in the same analysis (Tabachnick & Fidell 2001); including those variables reduces the reliability of results from further analyses. The *Pearson correlation coefficient* and the *Variance Inflation Factor – VIF* ( $1/\text{Tolerance}$ ) were used to check for multicollinearity and singularity among attitudinal items, for each interest group separately. Pairs of variables with correlation coefficients higher than .90

(Tabachnick & Fidell 2001) or *VIF* higher than 10 (Pestana & Gageiro 2000) were considered multicollinear and one of the variables was omitted from analyses. In this study, none of the variables were considered to be correlated with each other, and none were excluded from analyses.

### **3.1.6. Data Analysis**

One purpose of the study is to understand the general public's attitudes, knowledge and fear of wolves in the study area and to compare the results among interest groups. In addition, this study compares attitudes, knowledge and fear of wolves inside the study area to see if there is any association between the variables. The first step is to calculate a score for attitudes, knowledge and fear for each respondent. All the statistical analyses were done using the software SPSS version 20.

#### **3.1.6.1. Attitudinal scores**

The questionnaire used for interviewing the public contains a large set of items targeted at understanding people's attitudes toward wolves and wolf management. Principal Component Analysis was chosen as the statistical technique able to help discovering which variables in the set form coherent subsets that are relatively independent of one another (Tabachnick & Fidell 2001). PCA uses the correlations among the variables to develop a small set of components that are thought to reflect underlying processes that have created the correlations among the variables (Tabachnick & Fidell 2001). When running the PCA, a new variable is created for each component. These variables represent the attitudinal scores toward wolves and wolf management issues that respondents would have received if they had been measured directly. When scores on components are estimated for each respondent, they are often more reliable than scores on individual observed variables (Tabachnick & Fidell 2001). Once the data were investigated for univariate and multivariate outliers and missing data, the steps for the PCA followed the framework suggested by Tabachnick & Fidell (2001):

- Sample sizes: it is important that sample sizes be large enough that correlation coefficients are reliably estimated. In this study, the sample size is 359, which is fairly good for producing reliable results (Comrey & Lee 1992).
- Factorability of the correlation matrices: a matrix that is factorable should include several sizable correlations ( $r > .30$ ) (Tabachnick & Fidell 2001). The Kaiser-Meyer-Olkin



measure of sampling adequacy (KMO) requires high values ( $>.60$ ) for good PCA (Tabachnick & Fidell 2001). In this study, the KMO reached a value of 0.786.

- Number of factors: the Scree test was used to know the number of factors needed to summarize the pattern of correlations in the correlation matrix, in order to obtain a parsimonious solution (Tabachnick & Fidell 2001).
- Type of rotation: the interpretation of the extracted components was done after a Varimax rotation, aimed at maximizing the variance of factor loadings by making high loadings higher and low ones lower for each factor (Tabachnick & Fidell 2001).
- Nature and importance of components: each component was interpreted using the variables loading higher on that component. The issue or set of issues from those items was used to characterize and assign a name to the component. The greater the loading, the more the variable is a pure measure of the factor (Tabachnick & Fidell 2001). Loadings in excess of .45 (20% overlapping variance) are considered fair by Comrey & Lee (1992), but the choice of the cut-off for size of loading to be interpreted is a matter of researcher preference (Tabachnick & Fidell 2001). In this study, only variables with loadings of .40 or higher are interpreted to avoid the exclusion of items that might be helpful in interpreting the results; the same cut-off value was used by Hook & Robinson (1982) and previous studies done in Portugal using the same methodology (Espírito-Santo & Petrucci-Fonseca 2006, Espírito-Santo 2007). The importance of the components was evaluated by the proportion of variance accounted for by the component after the Varimax rotation.

### **3.1.6.2. Knowledge scores**

A knowledge score for each respondent was used for summarizing the information of the twelve belief items of the questionnaire. Knowledge questions are multiple-choice and include the response "I'm not sure" to eliminate guessing and missing information. Each correct answer received a score of 1, with incorrect answers and "I'm not sure" responses (both coded as zero) indicating lack of correct information held by the respondent, as used by Bath (1989, 1993). For each respondent, all the correct answers (coded as 1) were summed, and the resulting value represents the knowledge score. This score varies between zero, if none of the questions was answered correctly, and twelve, the maximum score that corresponds to all questions being answered correctly.

### **3.1.6.3. Fear scores**

Some of the attitudinal items specifically related with Fear of wolves (A18, A20, A21 and A23) were not included in the PCA analysis for the construction of the attitudinal factors, as in previous studies. They were analysed separately and used to produce a Fear Score, using the same methodology as for the Knowledge Score. This decision was based on the fact that for most interest groups sampled in previous human dimension studies in Portugal, items related to Fear loaded together in one single component produced with PCA. In addition, Fear was proved to be highly correlated with Knowledge (Espírito-Santo 2007). The importance of Fear in explaining attitudes or knowledge about wolves as well as understanding which factors may affect people's fear of wolves was something important to explore in detail in this study.

For items A18, A20 and A21 the response set varies between 1 and 5, which can be interpreted as ranging between “No Fear” and “Strong Fear”. For question a23, answers were recoded because respondents could choose as many animals as they wish, which resulted in many combinations of possible sets of answers. The answers were recoded with code 1, when wolf was not considered a dangerous animal for humans, with code 2 when the respondent pointed the wolf, among other animals, as equal threats to humans, and code 3 when the wolf was considered the most dangerous animal to humans.

For each respondent, all the answers for these four items were summed, and the resulting value represented the Fear score. This score varies between four, if all the items were given the lowest code, representing “no fear”, and eighteen, the maximum score that corresponds to “strong fear”. Respondents with missing values for any of the items were excluded and not assigned a Fear score. This situation occurred only with two cases among respondents from the general public and with two police officers.

### **3.1.6.4. Relationship between attitudes, knowledge and fear of wolves**

Pearson's Correlation Coefficient was calculated to determine whether correlations existed among attitudes, knowledge and fear of wolves. For all statistical tests,  $p \leq .05$  was required for significance.

### **3.1.6.5. Factors affecting attitudes, knowledge and fear of wolves**

The relationship of socio-demographic characteristics (gender, age, municipality, occupation, education, having children) or other factors (e.g. importance of wolf management

issues, experience of wolves) on attitudes, knowledge and fear about wolves were assessed through a series of multiple regression analyses for each interest group individually.

A regression technique was used because the independent variables might be correlated with one another and with the dependent variables to varying degrees (Tabachnick & Fidell 2001). In these analyses, socio-demographic characteristics and other factors are treated as independent variables. The first attitudinal component extracted with the PCA (the one that explains most of the variance) for each interest group, knowledge scores and fear scores are treated as dependent variables. The attitudinal components built with the PCA for the general public and hunters were reflected before conducted the regression analyses, so that an increase in these dependent variables mean increase of attitudes (values were multiplied by -1 to change the signal); this will simplify the interpretation of results from regression analyses. All the variables were checked for evaluation of assumptions and independent variables entered as listed in Table 7 and Table 8.

Table 7 - Variables that may affect attitudes, knowledge and fear of wolves.

ID	Name	Meaning	Codes
D1	CAPTIVITY	Have you ever seen a wolf in captivity?	1) yes 0) no / not sure
D2	WILD	Have you ever seen a live wolf in the wild?	1) yes 0) no / not sure
D4	WILD_OTHERS	Do you know anyone who has seen a live wolf in the wild?	1) yes 0) no / not sure
D6	ISSUE	Importance of the wolf management issue in Portugal	1 (not important) – 10 (very important)
D7	UPDATED	Importance of keeping up to date with the issue of wolf management in Portugal	1 (not important) – 10 (very important)
E1	GENDER	Gender	1) female 0) male
E2	AGE	Age	age mentioned by the respondent
<sup>1</sup>	WOLFPRES	Wolf presence in respondent's residential area (parish)	0) no 1) yes (probable or confirmed)
E4	OCCUPATION	Occupation of respondent is farming, forestry, logging, etc	1) farmers, foresters, loggers 0) other
E5	EDUCATION	Education Level	1) no scholar education 2) elementary (1st-4th grade) 3) college (5th-6th grade) 4) college (7th-9th grade) 5) high school (10th-12th grade) 6) university (bachelor or major) 7) university (graduation)
E6	CHILDREN	Respondent has children under 13 years of age	0) no children 1) has children
E10	PETDOGS	Respondent has dogs as pets	0) no pets 1) has pets
E14	DAMAGE_OTHERS	Do you know anyone who has had damage caused by wolves to livestock?	1) yes 0) no / not sure

<sup>1</sup> Data collected within action A2 of the project.

Standard multiple regression was used because all the independent variables enter into the regression equation at once; each one is evaluated in terms of what it adds to prediction of the dependent variable that is different from the predictability afforded by all the other independent variables (Tabachnick & Fidell 2001).

Table 8 - Extra variables that may affect attitudes, knowledge and fear of wolves, analysed specifically for some interest groups.

ID	Name	Meaning	Codes
<b>GENERAL PUBLIC</b>			
E3	ALMEIDA	The respondent lives in Almeida	1) yes 0) no
E3	FCRODRIGO	The respondent lives in Figueira de Castelo Rodrigo	1) yes 0) no
E3	GUARDA	The respondent lives in Guarda	1) yes 0) no
E3	IDNOVA	The respondent lives in Idanha-a-Nova	1) yes 0) no
E3	PENAMACOR	The respondent lives in Penamacor	1) yes 0) no
E3	PINHEL	The respondent lives in Pinhel	1) yes 0) no
E3	SABUGAL	The respondent lives in Sabugal	1) yes 0) no
<b>LIVESTOCK OWNERS</b>			
E11	LIVESTOCK	What kind of livestock do you have?	1) sheep 2) goats 3) cattle 4) other (ex. donkeys) 5) sheep+cattle (...) 15) sheep+goats+cattle+other
<sup>2</sup>	NLIVESTOCK	Total amount of livestock (number of animals)	number mentioned by the respondent
<b>HUNTERS</b>			
E8	GROUND	Type of hunting ground where respondent hunts	1) from the municipality 2) national 3) free territory 4) associative 5) touristic 6) from the municipality + associative (...) 10) all
E9	HUNTDogs	Do you have hunting dogs?	1) yes 0) no
<b>POLICE OFFICERS</b>			
<sup>3</sup>	CATEGORY	Category (position) inside the police	1) SEPNA 2) former forest ranger; today SEPNA 3) GNR

<sup>2</sup> Extra information collected during the interviews with the livestock owners.

<sup>3</sup> Extra information collected during the interviews with the police officers.

The value of adjusted  $R^2$  was examined to evaluate the goodness-of-fit of the model. The significance value of the  $F$ -statistics helped in assessing if the independent variables explained most of the variance of the dependent variable. A  $p$ -value of .05 was required for significance of the tests.

For some interest groups, like livestock owners, hunters and police officers, the regression analyses were done using extra variables that apply specifically to those groups (Table 8).

#### **3.1.6.6. Issues and type of information to be used in the communication campaign**

For each interest group, the Pearson correlation coefficient was calculated for pairs of variables containing the first attitudinal component produced with the PCA and the various knowledge questions from section B of the questionnaire. The objective is to detect gaps in knowledge that might be directly associated with attitudes toward wolves. A probability level of .05 was used in evaluating the statistical significance of the results.

#### **3.1.6.7. Comparison of attitudes, knowledge and fear of wolves among interest groups**

In order to identify differences in attitudes, knowledge and fear levels among interest groups, scores were compared by means of analysis of variance (one-way ANOVA) among the general public and other interest groups (livestock owners, hunters, media workers and police officers). Tukey's HSD *post hoc* procedure was used to determine which pair of groups differed significantly. Analysis of variance is a common statistical technique in attitudinal studies to detect differences among sample groups (e.g. Bath 1987, Bjerke *et al.* 1998, Kaltenborn *et al.* 1999, Pate *et al.* 1996). A probability level of .05 was used in evaluating the statistical significance of the results.

#### **3.1.6.8. Comparison of attitudes, knowledge and fear of wolves between the northern and southern parts of the study area**

T Test was used to compare attitudes, knowledge and fear levels between respondents from the northern and the southern parts of the study area. Since there is a large sample ( $n > 30$ ), assumption of normality of data was not a major concern. This test allows determining if the two sets of data are significantly different from each other. A probability level of .05 was used in evaluating the statistical significance of the results.

The northern part contains the municipalities of Guarda county: Figueira de Castelo Rodrigo, Pinhel, Almeida, Guarda and Sabugal. The southern part contains the municipalities of Penamacor and Idanha-a-Nova (from Castelo Branco county).

### **3.1.6.9. Comparison of attitudes toward wolves between the study area and other parts of Portugal**

The comparison of attitudes (attitudinal components) of the general public, between the study area and other regions south of the Douro River (sampled in 2002) and north of this River (sampled in 2005), was done through one-way ANOVA. Tukey's HSD *post hoc* procedure was used to determine which pair of groups differs significantly. A probability level of .05 was used in evaluating the statistical significance of the results.

The collection of data in other regions was done by the same interviewer/researcher, using exactly the same methodology. Data was analyzed with the same statistical procedures, which allows a reliable comparison of results. In summary, data on attitudes toward wolves analyzed here refers to:

- the general public from the counties of Viseu and part of Aveiro, from 2002;
- the general public from the county of Vila Real, from 2005;
- the general public from the county of Guarda (North of the study area), from 2013;
- the general public from the county of Castelo Branco (South of the study area), from 2013.

### **3.1.6.10. Comparison of attitudes toward wolves in the study area today and some years ago**

The comparison of attitudes (attitudinal components) of the general public, sampled in this study (2013), with data collected in the same area, in 2002, was done through the T Test. A probability level of .05 was used in evaluating the statistical significance of the results.

The collection of data in the same region as this project, in previous years, was done by the same interviewer/researcher, using exactly the same methodology, and data analyzed with the same statistical procedures. In summary, data on attitudes toward wolves analyzed here belongs to:

- the general public from the county of Guarda, from 2002;
- the general public from the county of Guarda (North of the study area), from 2013;
- the general public from the county of Castelo Branco, from 2002;
- the general public from the county of Castelo Branco (South of the study area), from 2013.

## 4. Results

### 4.1. Characterizing the Sample

For the collection of data, a total of 359 respondents from the study area were sampled in this study and none of the questionnaires was discarded during the analysis. This sample size accomplishes the objectives set for this study. The number of 400 questionnaires was not reached because students are not sampled within this Action. However their questionnaires will be analyzed in 2014 and compared with data collected in this Action. Overall, the sample sizes allow statistically meaningful comparisons of attitudes, knowledge and fear of wolves among interest groups and zones (Table 9).

Table 9 – Sample sizes for each interest group by municipality.

Interest Group	Municipality								TOTAL
	North of the study area					South of the study area			
	F.C.Rodrigo	Almeida	Pinhel	Guarda	Sabugal	Penamacor	I.Nova	Outro	
general public	13	12	19	43	30	13	20	0	150
livestock owners	9	25	6	3	14	3	2	0	62
hunters	3	15	9	2	14	4	5	0	52
media workers	0	1	1	9	1	0	0	8	20
police officers	0	20	18	18	0	6	11	2	75
TOTAL	25	73	53	75	59	26	38	10	359

The sample of the general public is not representative of the entire population in the area, because a total of 385 interviews would be needed to accomplish that goal (Sheskin, 1985). Nevertheless, the objective of doing 150 interviews was reached. This number of cases allows meaningful statistical analyses and provides a good insight on the public's opinions.

For the livestock owners, we only have the total number of breeders in some counties, like Almeida. In 2013, according to the information provided by the local livestock breeders' association in Almeida, there were 422 breeders. We sampled 25, which means we only interviewed 6% of them. This number is apparently very low, but these livestock owners were not selected randomly in terms of location in the municipality and level of damage. We believe it would be important to gather information on their attitudes in the most conflictive areas, so we made an effort to find the breeders in areas where most damage to livestock was

occurring. Although we might have a small sample size, we believe we have a clear vision of livestock owners' opinions in the most conflictive areas.

In terms of hunters, there are 273 hunting zones in the project area, but we do not have data on the number of hunters in each zone. It is very complex to understand exactly how many hunters hunt in each zone. One registered hunter can use several zones without being registered in all of them. Other zones ("touristic hunting zones") are used mainly by hunters living in urban areas like Lisbon and we do not have the chance to interview them. So, the objective was to randomly interview as many local hunters as possible across the project's area.

As for media workers, we estimate a total of 50 people in all local radios and newspapers. All of them were contacted and we managed to interview almost half of them (20 people).

Regarding the police officers, the goal was to interview all members of GNR/SEPNA in the project's area. This objective was accomplished since the vast majority of them were sampled (more than 80%); only those not on duty or on vacation were not sampled. A residual number of police officers refused to answer.

The sample consists of 79 females (22%) and 278 males (78%), and most respondents are young adults and adults, followed by elderly with 65 or more years of age (Fig. 3). The oldest respondent is 88 years old. Fewer young people live in central inland regions of the country than near the coast, and that is evident in the age structure of respondents sampled in this study. The mean age of respondents was 51 years old.

The vast majority of respondents from the general public have an elementary school education (Table 10). A minority have completed high school or a university degree. Livestock owners and hunters mostly have elementary school, while police officers and media workers mostly have high school, thus being the groups with the highest education degree. Overall, the sample is characterized by a low level of school education.



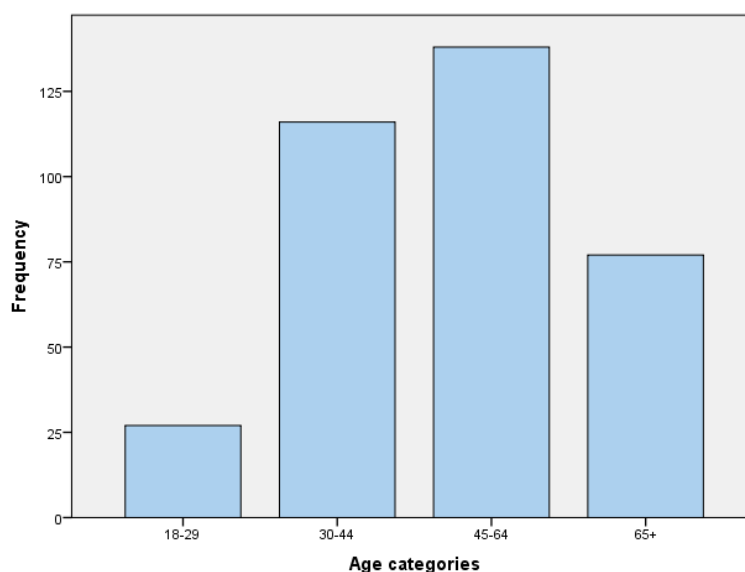


Figure 3 – Age categories of respondents sampled.

Table 10 – Level of education of respondents from the general public and the various interest groups.

Interest Group	Level of School Education					TOTAL
	none	elementary (1 <sup>st</sup> -4 <sup>th</sup> grade)	college (5 <sup>th</sup> -9 <sup>th</sup> grade)	high school (10 <sup>th</sup> -12 <sup>th</sup> grade)	university degree	
general public	7	76	35	21	11	150
livestock owners	2	28	17	13	2	62
hunters	0	24	16	9	3	52
media workers	0	0	0	4	16	20
police officers	0	1	15	53	6	75
TOTAL	9	129	83	100	38	359

#### 4.1.1. Attitudes Toward Wolves and Wolf Management

PCA extracted between eight and ten components for data of each interest group, which makes it difficult for a clear interpretation. The following tables present the items, the components and the loadings that explain most of the variance. Usually just one to three components are presented. Components with only one or two variables and low loads, and items loading in components that explain a reduced amount of variance are not presented.

Loadings of variables on components, and variance percentages are shown in the tables. Variables are ordered and grouped by size of loading to facilitate interpretation. Loadings

under .40 are omitted from the tables. Interpretative labels are suggested for each component in a footnote.

#### **4.1.1.1. General public**

For the general public, most variables loaded on a single component, which reflects homogeneity of the items on attitudes toward wolves or wolf management. With a cut-off of .40 for inclusion of a variable in the interpretation of a component, only 1 of the 32 variables did not load on any component. The first component explains 30% of the variance in the original variables and is the most important one (Table 11). It provides information on the public's opinion toward the Existence Value of wolves. Items loading positively on this or other component show that respondents agree with that sentence. In this case, people who agree with the presence of wolves, do not agree with hunting wolves or lethal control of the species. Interpretation of the table has to be done at the same time as the frequency plots in order to have a better idea on how people tend to think about wolves. The frequency plots are presented below (Fig. 4a,b,c).

Components 2 and 3 explain residual variance (13.93%), and provide information on attitudes of the general public toward wolf management issues. The second component provides information on how the general public feels about the impact of wolves on livestock. Component 3 refers to Compensation issues.

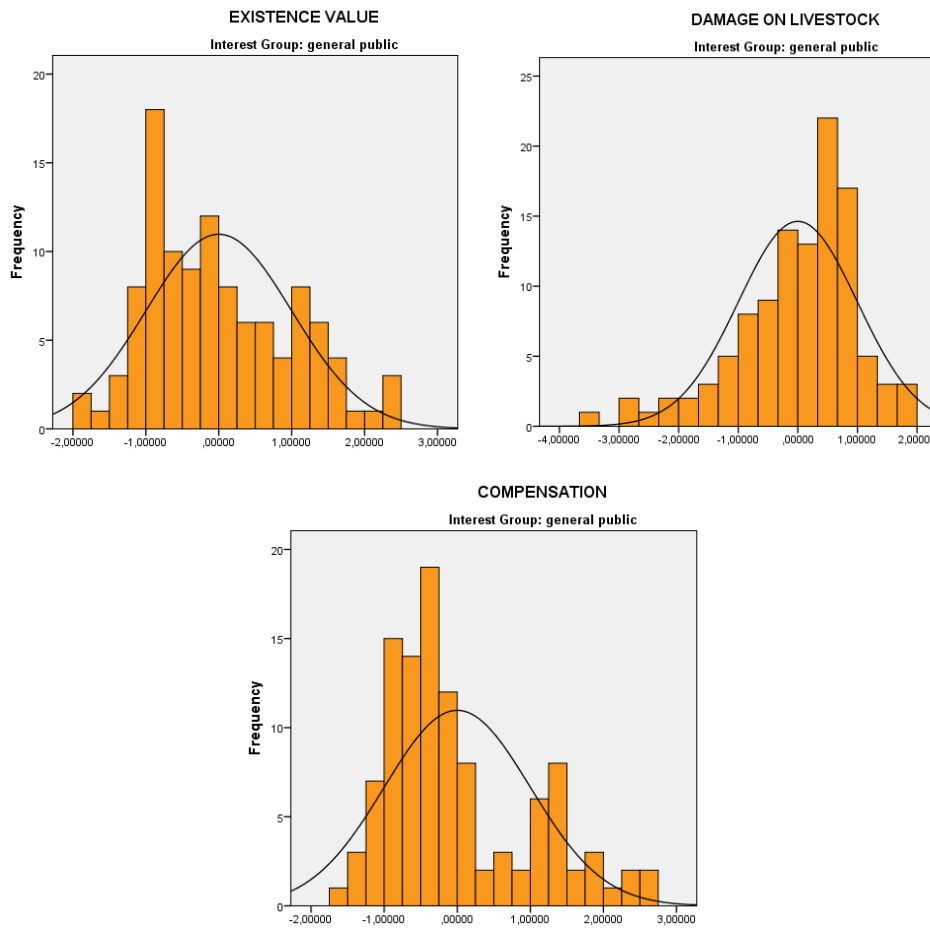
The frequency plots of components extracted with the PCA for the general public show an unimodal distribution for the components which reflect homogeneous opinions toward the issues. Although close to a neutral opinion, most respondents have a slightly negative attitude toward the *Existence value* of wolves (values tend to be below zero). In general most people are not in favour of having wolves or seeing the wolf population increase, but a significant percentage of people are positive towards wolves.

Most people share the opinion that wolves cause much damage to livestock and that this is the main source of food for wolves. Interestingly, a majority of the public does not agree with livestock owners receiving money for damage caused by wolves. Instead they think livestock owners should receive money for living in a zone where there are wolves instead of receiving compensation for losses caused by wolves.

Table 11 - Component loadings and variance percentages for principal components extraction and Varimax rotation on attitudinal items toward wolves and wolf management for the general public.

ITEM	1 <sup>a</sup>	2	3
A5. Whether or not I see a wolf, it is important to me that they exist in this municipality.	-.887		
A3. It is important to maintain wolf populations in Portugal for future generations.	-.839		
A10. It is unnecessary to have wolves in Portugal because abundant populations already exist in other European countries.	.838		
A1. Which answer best describes your opinion about wolves?	-.816		
A2. To have wolves in Portugal is:	-.791		
A22. Wolves have the right to exist as any other species.	-.745		
A13. Wolves should be allowed to be hunted year round.	.715		
A9. It is unnecessary to have wolves in this municipality because abundant populations of wolves already exist in other parts of Portugal.	.673		
C2. If a wolf killed livestock, I would agree with killing that wolf.	.634		
C1. I would agree with increasing wolf numbers in Portugal.	-.630	-.574	
A12. Wolves should be allowed to be hunted in specific hunting seasons.	.606		
A11. Wolves should be completely protected in Portugal.	-.603		
C7e. There should be authorized wolf hunts in Portugal.	.600		
A14. Wolves should be killed by all means including the use of snares and poison.	.517		
A17. Wolves cause abundant damage to livestock.		.747	
A19. In areas where wolves live near livestock, their primary food is livestock.		.637	
C4. There are enough wolves in Portugal.	.558	.578	
C7. Livestock owners that lose livestock due to wolf attacks should be compensated.			-.776
C5. Livestock owners should receive money for living in a zone where there are wolves instead of receiving compensation for losses that wolf causes.			.762
A4. We should ensure that future generations have an abundant wolf population.	-.451		.537
C7a. I would like part of my taxes to be used toward paying compensation for damage caused by wolves.		-.456	
A8. Wolves reduce populations of roe deer and wild boar to unacceptable levels.	.524		
<b>Percent of Variance Explained</b>	29.947	7.783	6.147

<sup>a</sup> **Component labels:** C1 - Existence value; C2 - Damage on livestock; C3 - Compensation.



Figures 4a,b,c – Frequency plots of responses from the general public to the attitudinal components extracted with the PCA.

Overall, these results show some public acceptance of wolves. The public is not strongly negative toward wolves and accepts some form of compensating livestock owners for living in areas with wolves. This compensation should not be in the form of payment for damage caused by wolf predation on livestock, but some system of payment *a priori* to help livestock owners support the risk of suffering damage. This result is an indication that people in favour of the implementation of preventive methods for wolf predation on livestock.

#### 4.1.1.2. Livestock owners

For the livestock owners, there is not such a strong homogeneity of the items as for the general public, because variables loaded on many different components. With a cut-off of .40 for inclusion of a variable in the interpretation of a component, all the 32 variables load on one component. The first component explains 32% of the variance in the original variables and is the most important one (Table 12).

Table 12 - Component loadings and variance percentages for principal components extraction and Varimax rotation on attitudinal items toward wolves and wolf management for the livestock owners.

ITEM	1 <sup>a</sup>	2	3	4
A2. To have wolves in Portugal is:	.891			
A10. It is unnecessary to have wolves in Portugal because abundant populations already exist in other European countries.	-.885			
A5. Whether or not I see a wolf, it is important to me that they exist in this municipality.	.862			
A3. It is important to maintain wolf populations in Portugal for future generations.	.829			
A1. Which answer best describes your opinion about wolves?	.815			
A22. Wolves have the right to exist as any other species.	.740			
C2. If a wolf killed livestock, I would agree with killing that wolf.	-.697			
A13. Wolves should be allowed to be hunted year round.	-.689			
A11. Wolves should be completely protected in Portugal.	.506	.502		
A17. Wolves cause abundant damage to livestock.	-.481		-.432	
C1. I would agree with increasing wolf numbers in Portugal.	.520	.747		
C4. There are enough wolves in Portugal.	-.502	-.666		
A16. Having wolves in this municipality may increase tourism.		.616		
A9. It is unnecessary to have wolves in this municipality because abundant populations of wolves already exist in other parts of Portugal.	-.605	-.611		
A4. We should ensure that future generations have an abundant wolf population.		.553		
A14. Wolves should be killed by all means including the use of snares and poison.			.841	
A19. In areas where wolves live near livestock, their primary food is livestock.			-.783	
C7b. The Government should pay compensation to livestock owners who lose livestock to wolves.				.777
C7. Livestock owners that lose livestock due to wolf attacks should be compensated.				.763
C6. Livestock owners should receive compensation for damage caused by wolves only if they do use methods to prevent damage, e.g., guard dogs.				-.605
<b>Percent of Variance Explained</b>	31.581	9.700	7.335	6.541

<sup>a</sup> **Component labels:** C1 - Existence value; C2 - Wolf population size; C3 - Killing wolves / Damage; C4 - Compensation.

Ten variables load strongly on component 1 which reflects the opinions toward the Existence value of wolves. Positive loads on this component show that livestock owners believe wolves should exist and negative loadings show disagreement over killing/hunting wolves. However the frequency plot of answers to these items shows that opinions are not homogeneous and spread along the attitudinal spectrum (Fig. 5a,b,c). There is no consistency among livestock owners and many respondents show polarized opinions (strongly disagreeing or strongly agreeing).

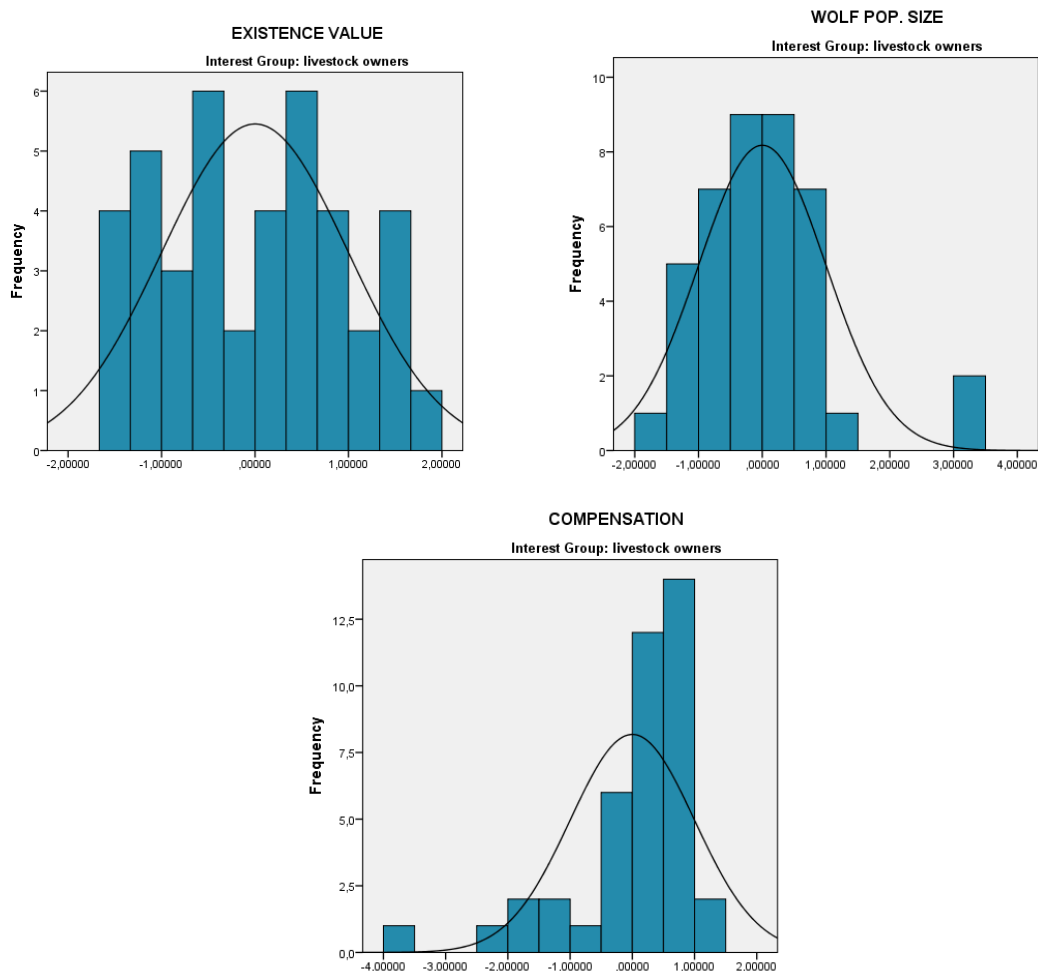


Figure 5a,b,c - Frequency plots of responses from the livestock owners to the attitudinal components extracted with the PCA.

In terms of the second component, which reflects livestock owners' opinions about the size of the wolf population, the majority of respondents are in a neutral position. This means that most livestock owners do not have an opinion about this issue or are slightly negative toward the idea of a wolf population increase. The third component only has two variables with two distinct meanings and its interpretation is not easy or useful.

Another important issue in wolf management is livestock owners' attitudes towards compensation, which is summarized in component 4 (*Compensation*). Most livestock owners surveyed agree that government must pay them compensation for damage caused by wolves. The majority of respondents think that government should compensate all livestock owners, not only those using preventive methods.

#### **4.1.1.3. Hunters**

Data from hunters do not show a strong homogeneity of the items, because variables loaded on many different components. With a cut-off of .40 for inclusion of a variable in the interpretation of a component, all the 32 variables load on a component. The first component explains 29% of the variance in the original variables and is the most important one (Table 13). It refers to the opinion toward hunting wolves, which seems to be an important issue for hunters.

Hunters who say that wolves should be hunted in specific hunting seasons, also agree that if a wolf kills livestock it should be killed. These respondents are not completely in favour of the total protection of the species.

However, the frequency plot for this component shows that most hunters are very close to a neutral position (Fig. 6a). There are not many hunters with very polarized opinions, at the extremes of the attitude scale.

The frequency plot for the Existence value (second component) shows that most hunters have a positive opinion toward this issue (Fig. 6b). These are good news for wolf conservation. The loads on this component indicate that hunters believe wolves have the right to exist as any other species, and they want wolves to exist in the region (referring to the municipality where the respondent lives) even if there are abundant populations of wolves in other parts of Portugal or in other European countries.

The last component deals with compensation issues and most hunters are close to a neutral or slightly negative position (Fig. 6c). These respondents do not think livestock owners should receive money for living in an area with wolves instead of receiving compensation for losses caused by wolves. They also believe wolves cause many damage to livestock, thus not agreeing with abundant wolf populations in the future.

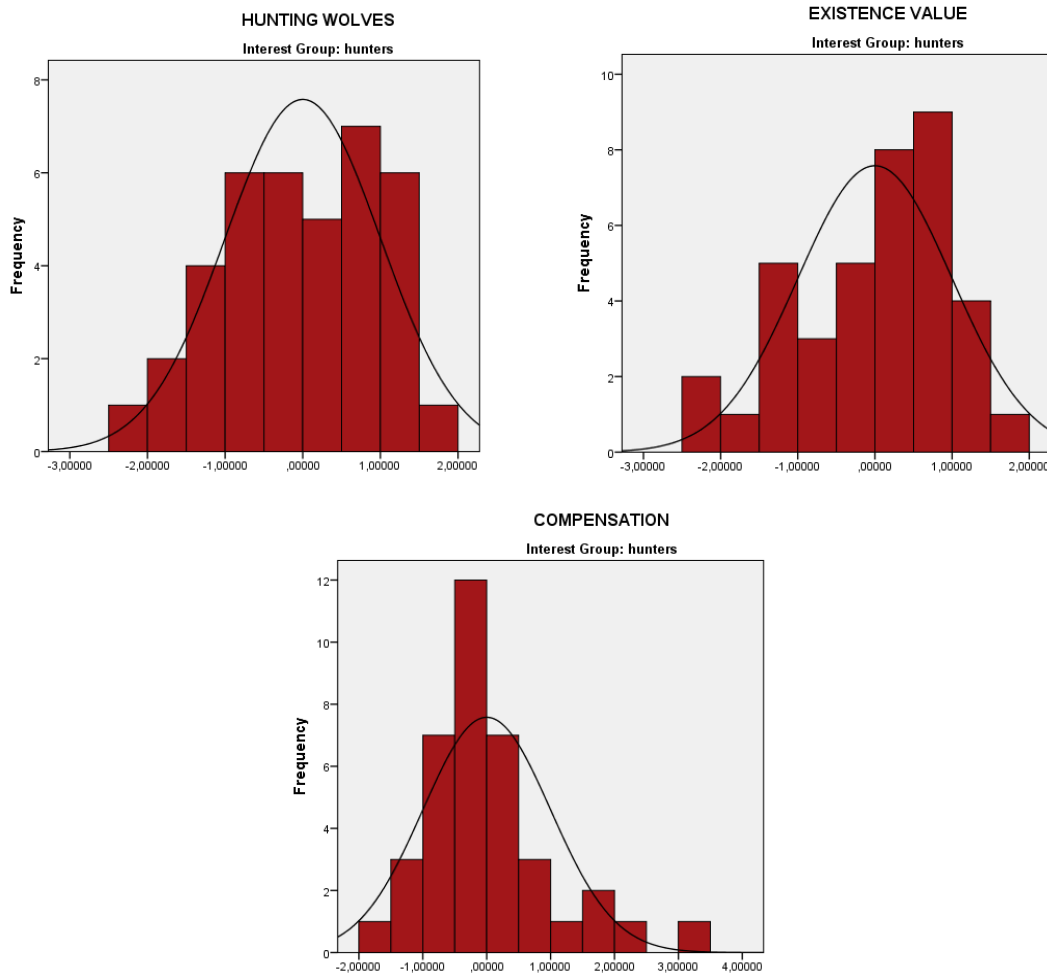


Figure 6a,b,c - Frequency plots of responses from hunters to the attitudinal components extracted with the PCA.

#### 4.1.1.4. Media workers

Five components were produced to explain opinions of media workers toward wolves (Table 14). These five issues account for explaining most of the variance and the first one is the most important one (33% of the variance explained). All the variables loaded in at least one component. Frequency plots are shown in Figure 7a,b,c,d,e.

The first component and the frequency plot show the opinions of media workers toward the Existence value of wolves. Most respondents tend to have a moderately positive opinion agreeing that wolves should exist, just like any other species, because there are not enough wolves in Portugal; and even say wolf numbers should increase. They believe the presence of wolves can increase tourism and does not cause abundant damage to livestock.



Table 13 - Component loadings and variance percentages for principal components extraction and Varimax rotation on attitudinal items toward wolves and wolf management for hunters.

ITEM	1 <sup>a</sup>	2	3
A12. Wolves should be allowed to be hunted in specific hunting seasons.	.875		
C7e. There should be authorized wolf hunts in Portugal.	.789		
A1. Which answer best describes your opinion about wolves?	-.733		
A11. Wolves should be completely protected in Portugal.	-.732		
A2. To have wolves in Portugal is:	-.666	.514	
C2. If a wolf killed livestock, I would agree with killing that wolf.	.656		
A10. It is unnecessary to have wolves in Portugal because abundant populations already exist in other European countries.		-.857	
A5. Whether or not I see a wolf, it is important to me that they exist in this municipality.		.843	
A3. It is important to maintain wolf populations in Portugal for future generations.		.826	
A9. It is unnecessary to have wolves in this municipality because abundant populations of wolves already exist in other parts of Portugal.		-.782	
A22. Wolves have the right to exist as any other species.		.743	
C5. Livestock owners should receive money for living in a zone where there are wolves instead of receiving compensation for losses that wolf causes.			.802
A4. We should ensure that future generations have an abundant wolf population.	-.414		.737
A17. Wolves cause abundant damage to livestock.			-.580
C6. Livestock owners should receive compensation for damage caused by wolves only if they do use methods to prevent damage, e.g., guard dogs.			.569
C4. There are enough wolves in Portugal.			-.457
A7. Wolves have a big impact on small game.	.507		
A16. Having wolves in this municipality may increase tourism.	-.423		
<b>Percent of Variance Explained</b>	28.648	8.840	7.784

<sup>a</sup> **Component labels:** C1 - Hunting wolves; C2 - Existence value; C3 – Compensation.

Table 14 - Component loadings and variance percentages for principal components extraction and Varimax rotation on attitudinal items toward wolves and wolf management, for media workers.

ITEM	1 <sup>a</sup>	2	3	4	5
C1. I would agree with increasing wolf numbers in Portugal.	.885				
A17. Wolves cause abundant damage to livestock.	-.825				
A16. Having wolves in this municipality may increase tourism.	.800				
A5. Whether or not I see a wolf, it is important to me that they exist in this municipality.	.755				
A4. We should ensure that future generations have an abundant wolf population.	.745		.427		
A3. It is important to maintain wolf populations in Portugal for future generations.	.734				
A22. Wolves have the right to exist as any other species.	.714				
C4. There are enough wolves in Portugal.	-.625				.418
A8. Wolves reduce populations of roe deer and wild boar to unacceptable levels.	-.497		.413		
A14. Wolves should be killed by all means including the use of snares and poison.		.956			
A12. Wolves should be allowed to be hunted in specific hunting seasons.	-.494	.828			
A13. Wolves should be allowed to be hunted year round.		.803			
C7e. There should be authorized wolf hunts in Portugal.		.790			
A7. Wolves have a big impact on small game.			.972		
A6. Wolves have a big impact on big game.			.686		
C7f. The Government should help livestock owners to implement methods for preventing damage, e.g. good guarding dogs and fences.			.661		
A1. Which answer best describes your opinion about wolves?				.909	
C7a. I would like part of my taxes to be used toward paying compensation for damage caused by wolves.				.738	
A10. It is unnecessary to have wolves in Portugal because abundant populations already exist in other European countries.				-.705	
C3. I would be willing to contribute money toward a compensation program for livestock owners for losses due to wolves.	.413			.547	-.509
A19. In areas where wolves live near livestock, their primary food is livestock.					.913
C7. Livestock owners that lose livestock due to wolf attacks should be compensated.			.519		.593
C2. If a wolf killed livestock, I would agree with killing that wolf.		.587			-.589
C7d. The Government should pay for this insurance for livestock owners.			.495	.436	-.537
A9. It is unnecessary to have wolves in this municipality because abundant populations of wolves already exist in other parts of Portugal.		.429	-.438		
<b>Percent of Variance Explained</b>	33.129	14.996	12.409	8.736	7.435

<sup>a</sup> **Component labels:** C1 - Existence value; C2 - Lethal control; C3 - Impact on game; C4 – Wolf population size + Compensation; C5 – Damage to livestock.

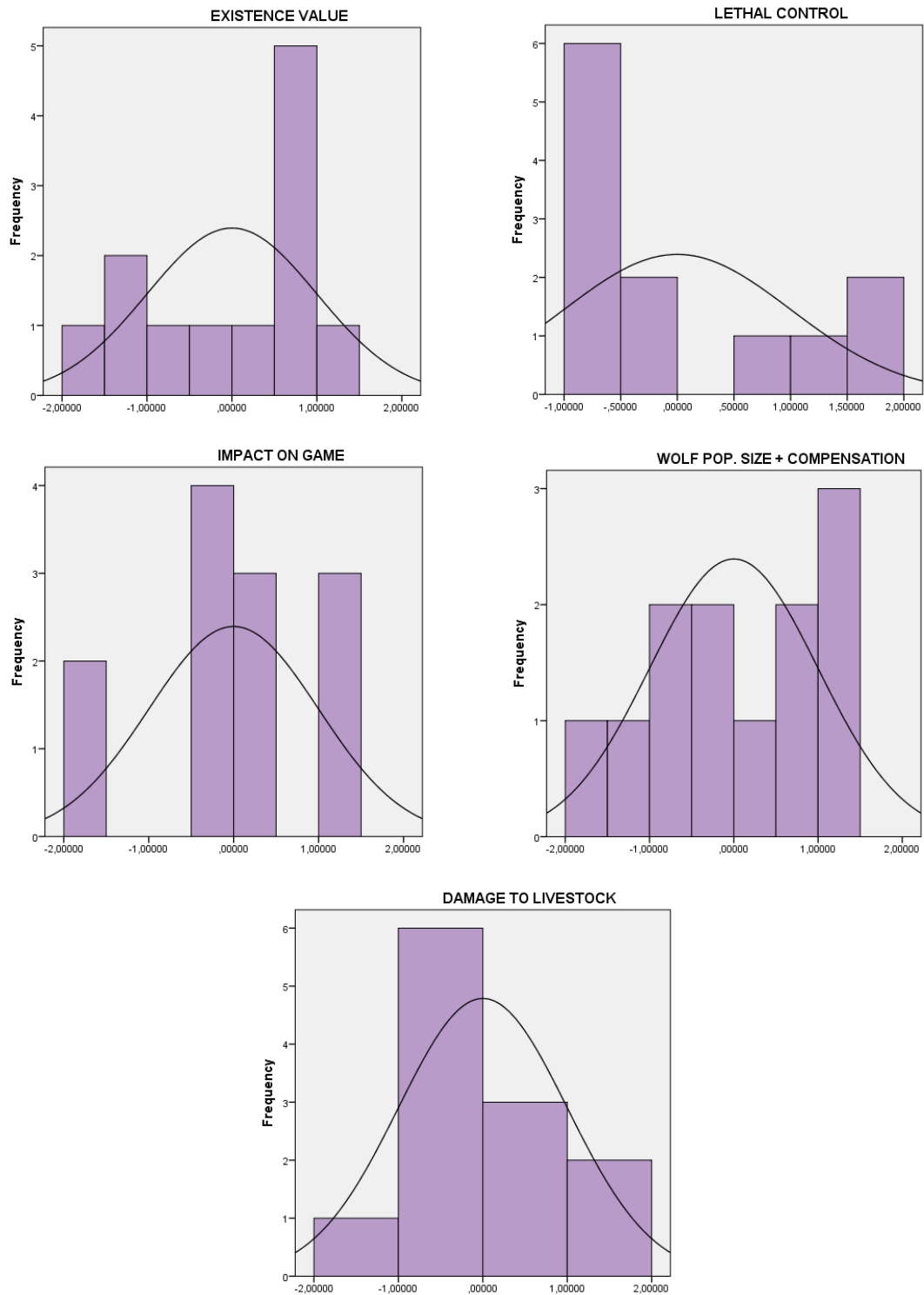


Figure 7a,b,c,d,e - Frequency plots of responses from the media workers to the attitudinal components extracted with the PCA.

The second component gives us an idea of how a group of media workers are in favour of lethal control of wolves. Although they are a minority, there are still some respondents who agree that wolf hunting should be legal and that wolves should be killed by all means, even

with snares and poison. It is very important for managers to have a clear vision of these details, since media workers can have an important role in changing attitudes of the public through powerful messages in the press. A very negative group of media workers can send inaccurate and extremely negative information about wolves in a local or regional newspaper, and this can represent a serious threat to local wolf conservation efforts. As seen above, the majority of the general public holds a moderately negative opinion about wolves. These people can change their attitudes easily to the lower end of the attitude scale, after reading negative news about wolves, and shift to a strongly negative attitude. This group of media workers must be under the scope of a powerful information campaign about wolves, which will contribute towards the success of any wolf conservation project.

The third component is about the issue of wolf's impact on game. Respondents in agreement with the statements included in this component believe wolves have a strong impact on big and small game. The frequency plot shows, however, that opinions diverge along the spectrum of attitudes. Most media workers hold a neutral opinion but a few respondents are completely against or moderately in favour of these statements. These results show that this issue generates different opinions. Messages included in the information campaign targeted at this interest group should focus on the real impact of wolves on game species.

Variables loading on the fourth component describe the opinion of respondents toward increasing the wolf population size and the willingness toward seeing their taxes being used in the payment of compensations for damage to livestock caused by wolves. The frequency plot shows that opinions of media workers diverge from negative to neutral and to positive opinions toward these statements. It is difficult for managers to predict this interest group's opinion toward these issues, but it is reasonable to assume that those in favour of seeing a large wolf population are also willing to pay for a compensation system.

However the majority of the media workers sampled in this study are slightly negative because they believe wolves cause abundant damage to livestock. This can be seen in the last component and the frequency plot. This helps defining the right message to include in the communication campaign. It is important that media workers fully understand the real impact of wolves to livestock, which can affect the type of messages and news written by this interest group on the press. In the study area, and very often across the country, we see negative and inaccurate news about wolf attacks to domestic animals always showing the predator as an evil creature, without considering the point of view of conservationists or the accurate data collected by biologists or the authorities.

#### 4.1.1.5. Police officers

For the police officers, most variables loaded on four components. With a cut-off of .40 for inclusion of a variable in the interpretation of a component, all the 32 variables load on a component. The first component explains 31% of the variance in the original variables and is the most important one (Table 15). It refers to the Existence value of wolves for police officers. The frequency plot (Fig. 8a) shows a concentration of cases in the central part of the graph which means that most police officers hold a neutral opinion toward the presence of wolves. There is, however, a slight tendency for a moderately positive attitude among most respondents.

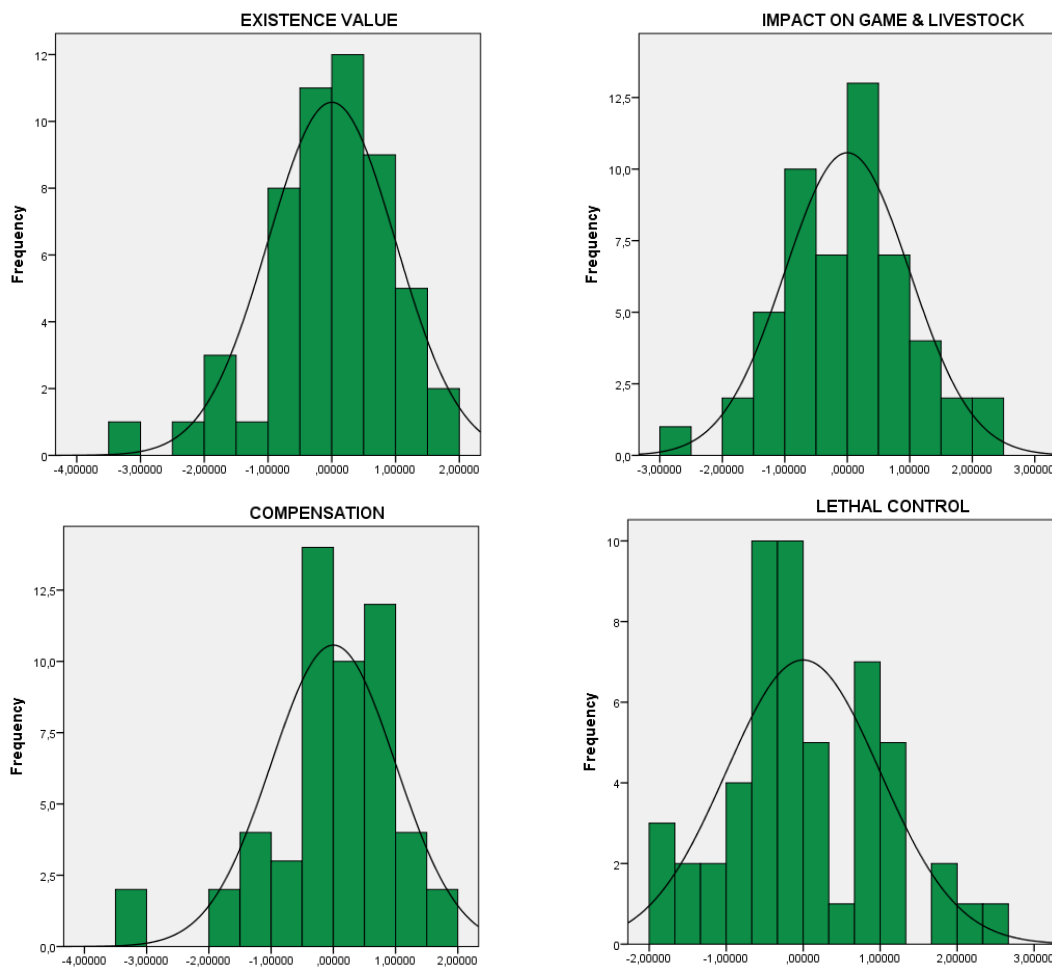


Figure 8a,b,c,d - Frequency plots of responses from the police officers to the attitudinal components extracted with the PCA.

Table 15 - Component loadings and variance percentages for principal components extraction and Varimax rotation on attitudinal items toward wolves and wolf management, for police officers.

ITEM	1 <sup>a</sup>	2	3	4
A2. To have wolves in Portugal is:	.872			
C1. I would agree with increasing wolf numbers in Portugal.	.848			
A1. Which answer best describes your opinion about wolves?	.846			
A3. It is important to maintain wolf populations in Portugal for future generations.	.846			
A5. Whether or not I see a wolf, it is important to me that they exist in this municipality.	.836			
C4. There are enough wolves in Portugal.	-.728			
A4. We should ensure that future generations have an abundant wolf population.	.725			
A15. Wolves keep roe deer and wild boar populations in balance.	.647			.420
A11. Wolves should be completely protected in Portugal.	.630			
A10. It is unnecessary to have wolves in Portugal because abundant populations already exist in other European countries.	-.606			
C2. If a wolf killed livestock, I would agree with killing that wolf.	-.563	.424		
A16. Having wolves in this municipality may increase tourism.	.550			
A22. Wolves have the right to exist as any other species.	.550			-.452
A6. Wolves have a big impact on big game.		.773		
A8. Wolves reduce populations of roe deer and wild boar to unacceptable levels.		.729		
A12. Wolves should be allowed to be hunted in specific hunting seasons.	-.549	.570		
A17. Wolves cause abundant damage to livestock.		.535		
A19. In areas where wolves live near livestock, their primary food is livestock.		.500		
C7b. The Government should pay compensation to livestock owners who lose livestock to wolves.			.885	
C7. Livestock owners that lose livestock due to wolf attacks should be compensated.			.826	
C7a. I would like part of my taxes to be used toward paying compensation for damage caused by wolves.			.689	
A14. Wolves should be killed by all means including the use of snares and poison.	-.463			.738
A13. Wolves should be allowed to be hunted year round.				.684
C7d. The Government should pay for this insurance for livestock owners.				.618
C7e. There should be authorized wolf hunts in Portugal.	-.407	.466		
A9. It is unnecessary to have wolves in this municipality because abundant populations of wolves already exist in other parts of Portugal.	-.433			
<b>Percent of Variance Explained</b>	30.596	10.668	8.525	7.158

<sup>a</sup> **Component labels:** C1 - Existence value; C2 - Impact on game and livestock; C3 – Compensation; C4 - Lethal control.

As for the second component (Impact on game and livestock), police officers tend to be neutral toward the idea of wolves having a significant impact on both prey. The same occurs with opinions toward compensation issues (Fig. 8b,c). Most respondents do not have a strong opinion about these issues. Although there is an increasing number of situations where police officers are called by livestock owners who report episodes of wolf predation on livestock, most police officers do not have very polarized views over these issues.

Regarding the lethal control of wolves as a management measure most police officers tend to disagree with the statements that load on the last component. This means that the use of snares or poison, as well as hunting wolves all year round, are not acceptable ideas for most police officers (Fig. 8d). Nevertheless, managers should take into consideration that a significant percentage of respondents moderately agree with these extreme measures. The usage of snares and poison is illegal, but some police officers agree with them. This is a controversial and serious problem that has to be dealt with an information campaign and meetings/workshops with this interest group.

#### 4.1.2. Knowledge About Wolves

The average score of respondents is 3.68. Considering that the scores vary between 0 (no correct answers) and 12 (all questions answered correctly), the scores show a very low knowledge about wolves. Most respondents answered more than 50% of the questions incorrectly (Fig. 9).

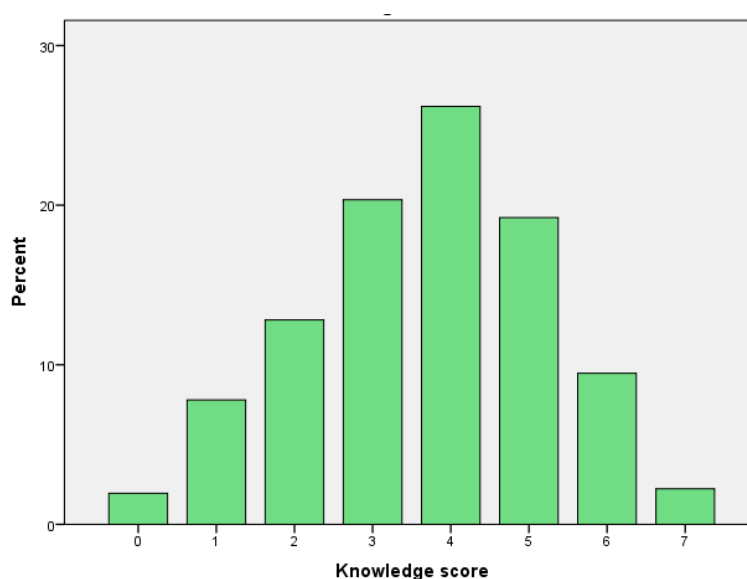


Figure 9 - Knowledge scores about wolves among all respondents sampled (knowledge scores ranging from 0 [low] to 12 [high]).

In general, questions related to the size and the trend of the wolf population in Portugal are answered incorrectly or are not answered. The same happens with items asking about various biological aspects of the species, such as the number of wolves in the pack that breed in each year, the number of livestock killed by wolves in the previous year in the municipality, or the success rate of wolves when chasing their prey. The majority of the respondents only answered correctly the items about the presence of wolves in the past in the municipality and the full protection of the species.

### 4.1.3. Fear of Wolves

The graph (Fig. 10) shows that a high percentage of respondents sampled in the study express absolutely no fear of wolves. However the majority of people show some fear of the species and most of them are on the second half of the fear scale (higher than 11, that corresponds to the centre of the scale), showing a stronger fear.

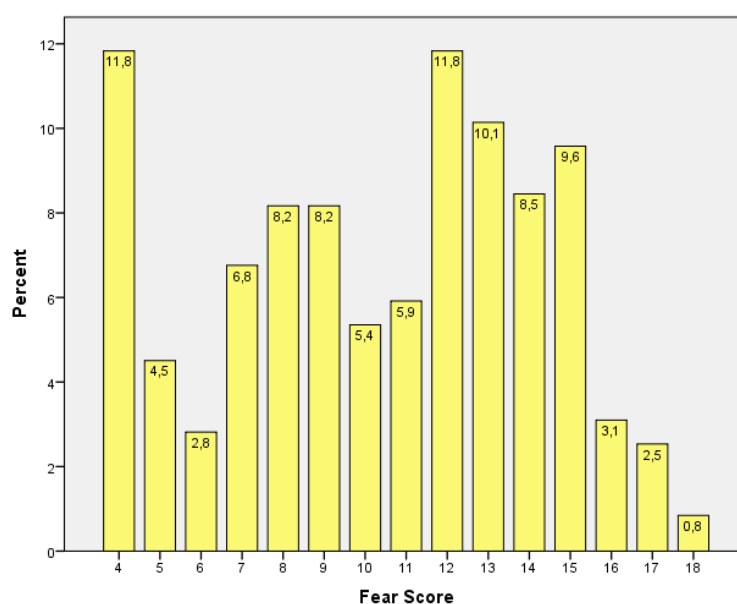


Figure 10 - Fear of wolves among all respondents sampled (fear scores ranging from 4 [no fear] to 18 [strong fear]); numbers on the bars show the percentages.

Table 16 shows that the questions that most likely are pulling the frequencies toward the top of the scale (strong fear) are A20 and A21. This means that people tend to fear an elusive species they cannot see. The idea of hiking in the woods where wolves might be present is something that causes a strong fear. As for question A21, the high percentage of responses expressing a strong fear is probably related with the fear felt by families with children,



because there is still this widespread idea that wolves might attack children like in the story of the Little Red Riding Wood. Later in this report, factors affecting fear will be analysed in more detail.

Table 16 - Percentages of responses to questions about Fear of wolves given by respondents sampled.

	Percentages in each response					Total
	Strongly disagree	Disagree	No opinion	Agree	Strongly agree	
<b>A18.</b> In areas where wolves live in close proximity to humans, wolf attacks on humans are common.	41.3	31.3	15.4	7.8	4.2	100
<b>A20.</b> I would be afraid to hike in the woods if wolves were present.	29.2	16.7	3.1	18.7	<b>32.3</b>	100
<b>A21.</b> I would be worried with my personal or my family's safety if wolves live near my home.	17.0	10.0	3.6	25.3	<b>44.0</b>	100
	not the wolf	wolf among other animals	the wolf			
<b>A23x.</b> In your opinion, which animal is most dangerous to humans?	59.8	27.8	12.4			100

#### 4.1.4. Relationship Between Attitudes, Knowledge and Fear of Wolves

The relationship between attitudes toward wolves and wolf management, knowledge levels and fear of the species was analysed with the Pearson correlation coefficient for pairs of variables. The attitudinal variable used was the one produced with the first component of the PCA because it is the one that explains most variance. Table 17 shows that there is only one pair of variables with a significant correlation: knowledge and fear. The correlation coefficient ( $r$ ) value is low but statistically significant, which means that there is a linear association between this pair of variables ( $r = -.207$ ;  $p \leq .001$ ). The absolute  $r$  value indicates the strength of the relationship, with larger absolute values indicating stronger relationships. The sign of the coefficients give us the direction of the relationship, which helps understanding how knowledge and fear are linked. Although weak, there is a correlation between the two variables. Low knowledge about wolves is associated with more fear of the species. The more people know about them, the less fear they have. Similar results were obtained in a previous study in this region (Espírito-Santo 2007).

Table 17 – Pearson correlation coefficients between attitudes toward wolves, knowledge and fear of the species.

		Attitude toward wolves	Fear score	Knowledge score
Attitude toward wolves	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	254		
Fear score	Pearson Correlation	.054	1	
	Sig. (2-tailed)	.393		
	N	253	355	
Knowledge score	Pearson Correlation	-.012	<b>-.207**</b>	1
	Sig. (2-tailed)	.844	.000	
	N	254	355	359

\*\*Correlation is significant at the 0.01 level (2-tailed).

Analyzing the correlation coefficients between pairs of variables for each interest group separately, there are different results (Table 18). For the general public, the scores of the first attitudinal component (toward the Existence value of wolves) are positively correlated with fear ( $r = .399$ ;  $p \leq .001$ ) but this does not mean that positive attitudes are associated with a stronger fear. In fact, since the loadings on the first component are mostly negative, the interpretation of these results shows that more negative attitudes are linked to a stronger fear. The same happens with results from hunters. Those more in favour of wolf hunting (first component extracted with the PCA) have their attitude associated with a stronger fear ( $r = .404$ ;  $p = .012$ ). Among livestock owners and police officers, the correlation between attitudes and fear is negative (respectively,  $r = -.417$ ;  $p = .007$  and  $r = -.304$ ;  $p = .028$ ), which means that positive attitudes are associated with a low fear. These results are consistent with previous studies (Espírito-Santo 2007). Knowledge and fear are correlated only in the case of hunters ( $r = -.291$ ;  $p = .036$ ). The sign of the coefficient is negative which means that hunters more fearful of wolves are those with a lower knowledge about the species. None of the other interest groups show a correlation between fear and knowledge. In the case of hunters fear is then associated with their attitudes, as seen above. Indirectly, more fear is associated with more negative attitudes.

Although it is generally accepted in the literature that positive attitudes toward wolves are linked with higher knowledge levels about the species, among specific interest groups attitudes cannot be improved just by providing information on wolf biology or ecology, through education programmes or information campaigns.

Table 18 - Pearson correlation coefficients between attitudes toward wolves, knowledge and fear of the species among the general public and various interest groups.

Interest Group			Attitude	Fear	Knowledge
<b>general public</b>	Attitude toward wolves	Pearson Correlation	1		
		Sig. (2-tailed)			
		N	110		
	Fear score	Pearson Correlation	<b>.399**</b>	1	
		Sig. (2-tailed)	.000		
		N	110	148	
	Knowledge score	Pearson Correlation	-.104	-.105	1
		Sig. (2-tailed)	.280	.205	
		N	110	148	150
<b>livestock owners</b>	Attitude toward wolves	Pearson Correlation	1		
		Sig. (2-tailed)			
		N	41		
	Fear score	Pearson Correlation	<b>-.417**</b>	1	
		Sig. (2-tailed)	.007		
		N	41	62	
	Knowledge score	Pearson Correlation	-.109	-.130	1
		Sig. (2-tailed)	.499	.314	
		N	41	62	62
<b>hunters</b>	Attitude toward wolves	Pearson Correlation	1		
		Sig. (2-tailed)			
		N	38		
	Fear score	Pearson Correlation	<b>.404*</b>	1	
		Sig. (2-tailed)	.012		
		N	38	52	
	Knowledge score	Pearson Correlation	-.101	<b>-.291*</b>	1
		Sig. (2-tailed)	.546	.036	
		N	38	52	52
<b>media</b>	Attitude toward wolves	Pearson Correlation	1		
		Sig. (2-tailed)			
		N	12		
	Fear score	Pearson Correlation	-.265	1	
		Sig. (2-tailed)	.405		
		N	12	20	
	Knowledge score	Pearson Correlation	.319	-.005	1
		Sig. (2-tailed)	.313	.985	
		N	12	20	20
<b>police officers</b>	Attitude toward wolves	Pearson Correlation	1		
		Sig. (2-tailed)			
		N	53		
	Fear score	Pearson Correlation	<b>-.304*</b>	1	
		Sig. (2-tailed)	.028		
		N	52	73	
	Knowledge score	Pearson Correlation	.225	-.184	1
		Sig. (2-tailed)	.105	.119	
		N	53	73	75

\*\*. Correlation is significant at 0.01 level (2-tailed). \*. Correlation is significant at 0.05 level (2-tailed).

These actions have to be designed in detail for each interest group, addressing the gaps of knowledge more directly targeted at reducing fear and consequently improving attitudes, as in the case of hunters.

#### **4.1.5. Factors Affecting Attitudes, Knowledge and Fear of Wolves**

Multiple Regression Analyses were conducted to evaluate the influence of several factors on attitudes, knowledge and fear of wolves. The value of adjusted  $R^2$  was examined to evaluate the goodness-of-fit of the model. The reported values of adjusted  $R^2$  are good and highly acceptable in social science research. Previous studies of attitudes toward large carnivores present reduced values of adjusted  $R^2$  (e.g. from 0.17 to 0.29 in Bath 1989; from 0.08 to 0.17 in Bjerke *et al.* 2001; and from 0.14 to 0.18 in Teel *et al.* 2002). Results from Regression Analysis for each interest group separately are shown in Tables 19, 20, 21, 22 and 23.

For data from media workers, the regression analyses could not produce a model using the method ENTER for inclusion of variables into the model. The alternative was to use the method Forward Stepwise with a 0.05 probability of F for a variable to enter and 0.10 for removal of a variable (Table 22). The model produced showed which variables are good predictors of the dependent variable (attitude toward wolves).

##### **4.1.5.1. General public**

Results of the Regression Analysis for this interest group are shown in Table 19.

##### **Attitudes**

Since the variable “attitudes toward the existence value of wolves” (factor 1 produced with the PCA) was reflected before doing the regression analysis, it is now easy to interpret the results. Through the analysis of the resulting model one we can say that respondents from the general public, who have seen a wolf in captivity, have more positive attitudes toward wolves. The same happens with those who know someone who have already seen a live wolf in the wild. A direct or indirect experience of seeing wolves seems to be an important factor for improving attitudes among the general public. The education level is also positively correlated with attitudes; the higher the education the more positive people are toward wolves.

The municipality where respondents live does not have an impact on attitudes toward wolves, except in the case of people from Sabugal. It is clear that the fact of living in this municipality is negatively associated with attitudes. This can explain why wolves have such

a strong difficulty in dispersing south in the study area. There seems to be a strong social barrier in the region of Sabugal that prevents wolves from moving south, although there is good habitat available for the species. This barrier seems to be related with the human pressure in the region, namely the negative attitudes.

### **Knowledge**

Knowledge scores of respondents from the general public are mainly affected by gender, the fact of having children and of living in the municipality of Idanha-a-Nova. Men and respondents with no children have the highest knowledge levels about wolves. Previous studies also show that men have more knowledge about the species than women (Espírito-Santo 2007). Further analysis of knowledge scores among people from different municipalities might help explaining the results from Idanha-a-Nova.

### **Fear**

The level of fear of wolves is higher among women and respondents from Figueira de Castelo Rodrigo, Guarda and Pinhel. In terms of gender is widely found in the literature that women are more fearful of wolves than men; with similar results being found for this region in previous studies (Espírito-Santo 2007). The fact that in some municipalities people show a stronger fear of wolves might be related to a stronger presence of wolves, a high occurrence of damage to livestock, recent dispersal areas or other factors.

#### **4.1.5.2. Livestock owners**

Results of the Regression Analysis for this interest group are shown in Table 20.

### **Attitudes**

Attitudes of livestock owners do not seem to be affected by any of the variables analyzed. Different methods of Regression Analyses were tested (Enter, Stepwise) and none of them produced a model. There might be other factors affecting opinions of this interest group (similar results were found by Espírito-Santo 2007).

### **Knowledge**

Gender and the experience with wolves affect livestock owners' knowledge about wolves. Higher knowledge levels are found among men and people who have already seen wolves in the wild. Again, gender seems to be an important variable explaining how much people know about the species.

### **Fear**

Gender shows up again as an important variable to explain how people feel about wolves. But in this case, women have their knowledge about wolves associated with a strong fear.

Same results were found among the general public, which shows some consistency. As seen above, fear and attitudes toward wolves are highly correlated among livestock owners. So, if we want to improve attitudes of this interest group we have to focus the efforts on women. Attitudes are not directly by gender, but are correlated with fear. By reducing fear, one should expect to improve attitudes and increase knowledge about wolves.

#### **4.1.5.3. Hunters**

Results of the Regression Analysis for this interest group are shown in Table 21.

##### **Attitudes**

Hunters' attitudes toward wolves (Hunting wolves) show no significant relationship with the independent variables analyzed.

##### **Knowledge**

Knowledge level show a significant relationship with the variable GROUND, which means that hunters who go hunting in several types of hunting grounds are more knowledgeable about wolves than hunters who hunt in just one type of hunting ground. Maybe, the level of experiences (ex. number of encounters with wolves) is higher among hunters who go hunting in several types of hunting areas and in different regions, and this experience increases their knowledge about the species.

##### **Fear**

Hunters' fear of wolves is significantly correlated with their age. Older hunters are more fearful of the species than young hunters. This might be explained with the fact that younger hunters have better access to information about the species, and thus realize that wolves do not represent a threat to human safety.

#### **4.1.5.4. Media workers**

Results of the Regression Analysis for this interest group are shown in Table 21.

##### **Attitudes**

Media workers' attitudes are affected by three independent variables: DAMAGE\_OTHERS, ISSUE and WILD. The first variable is negatively associated with attitudes, which means that media workers have their opinions affected by the fact of knowing someone with damage caused by wolves to livestock. Respondents who know people with these negative experiences have a more negative attitude toward wolves. These results make us think that media workers do not seem to be neutral in their opinions about the species, after experiencing an episode of wolf attack to livestock.

Positive opinions about wolves are more common among respondents with a strong interest in wolf management issues and respondents who report having seen a live wolf in the wild. Any efforts targeted at improving attitudes among media workers should focus on workers from newspapers and radios who usually report incidents of wolf attacks on livestock, and individuals who apparently do not show a strong interest in wolf issues or who never saw wolves in the wild.

### **Knowledge**

Media workers' knowledge about wolves is not associated with any of the independent variables analyzed in this study.

### **Fear**

Media workers' fear of wolves is not associated with any of the independent variables analyzed in this study.

#### **4.1.5.5. Police officers**

Results of the Regression Analysis for this interest group are shown in Table 22.

### **Attitudes**

Police officers with some interest in wolf management issues have more positive attitudes toward wolves than those with less interest. The association is not strong but it is significant. A much stronger variable that is affecting attitudes among police officers is the fact of knowing someone who has had damage caused by wolves to livestock. This is an important variable to have in mind, because it pulls their opinions to the negative part of the attitudinal scale. Another interesting result is that police officers with children have more negative attitudes than those who do not have children. This might be related with fear of wolf attacks and among police officers fear is associated with negative attitudes, as seen before.

### **Knowledge**

A significant and strong relationship exists between knowledge about wolves and the category of the police officers. The ordinal variable CATEGORY has values from 1 to 3. The value 1 corresponds to SEPNA, who are the police officers more closely linked to the protection of the environment. Value 2 is for former forest rangers, linked to surveillance of hunting activities and protection of the forest. Today these elements were integrated with SEPNA and share the same responsibilities. The value 3 was given to GNR police officers who are the local authorities in charge of dealing with a variety of other issues of enforcement. All these police officers work together in the same areas, but have different tasks.

Table 19 - Influence of socio-economic factors and personal experience with wolves on attitudes, knowledge and fear of wolves among the general public. Results from linear regression analyses.

Independent Variables	ATTITUDES <sup>1</sup>			Independent Variables	KNOWLEDGE			Independent Variables	FEAR		
	B	SE	Sig.		B	SE	Sig.		B	SE	Sig.
(Constant)	-.777	.850	.363	(Constant)	.244	.997	.807	(Constant)	6.438	2.308	.006
CAPTIVITY	<b>.354</b>	.178	.050	CAPTIVITY	.212	.238	.376	CAPTIVITY	-.937	.554	.093
WILD	-.057	.218	.795	WILD	.176	.265	.508	WILD	-1.003	.619	.108
WILD_OTHERS	<b>.565</b>	.204	.007	WILD_OTHERS	.266	.261	.310	WILD_OTHERS	-.072	.604	.906
ISSUE	-.024	.065	.709	ISSUE	.093	.078	.236	ISSUE	.191	.182	.294
UPDATED	.076	.060	.212	UPDATED	.075	.076	.326	UPDATED	-.084	.176	.635
GENDER	-.165	.195	.400	GENDER	<b>-1.127</b>	.246	.000	GENDER	<b>1.669</b>	.573	.004
AGE	-.001	.008	.872	AGE	.018	.010	.073	AGE	.042	.023	.073
ALMEIDA	-.301	.445	.501	ALMEIDA	.544	.530	.307	ALMEIDA	2.076	1.250	.100
FCRODRIGO	.127	.382	.741	FCRODRIGO	-.036	.506	.943	FCRODRIGO	<b>2.503</b>	1.183	.036
GUARDA	-.462	.299	.127	GUARDA	-.071	.348	.838	GUARDA	<b>2.508</b>	.825	.003
PENAMACOR	-.423	.363	.247	IDNOVA	<b>1.410</b>	.450	.002	IDNOVA	.837	1.055	.429
PINHEL	-.684	.355	.057	PENAMACOR	.500	.485	.305	PENAMACOR	1.935	1.135	.091
SABUGAL	<b>-.750</b>	.373	.047	PINHEL	-.124	.439	.778	PINHEL	<b>2.464</b>	1.036	.019
WOLFPRES	-.221	.287	.444	WOLFPRES	.233	.343	.497	WOLFPRES	-.095	.812	.907
OCCUPATION	-.547	.383	.157	OCCUPATION	.032	.525	.952	OCCUPATION	.296	1.216	.808
EDUCATION	<b>.206</b>	.091	.026	EDUCATION	.183	.109	.096	EDUCATION	.034	.254	.893
CHILDREN	-.149	.283	.601	CHILDREN	<b>-.830</b>	.341	.016	CHILDREN	.404	.790	.610
PETDOGS	.100	.207	.630	PETDOGS	.045	.256	.862	PETDOGS	.869	.600	.150
DAMAGE_OTHERS	-.175	.210	.406	DAMAGE_OTHERS	.280	.273	.308	DAMAGE_OTHERS	.389	.643	.546
Observations	106				141				139		
R-squared	0.359				0.375				0.285		
Excluded variables	IDNOVA				SABUGAL				SABUGAL		

<sup>1</sup> The dependent variable (DV) was reflected before conducted the regression analysis, so that an increase in the DV means increase of attitudes.

B = Unstandardized Regression Coefficients

SE = Standard Errors



Table 20 - Influence of socio-economic factors and personal experience with wolves on attitudes, knowledge and fear of wolves among livestock owners.

Results from linear regression analyses.

Independent Variables	ATTITUDES			Independent Variables	KNOWLEDGE			Independent Variables	FEAR		
	B	SE	Sig.		B	SE	Sig.		B	SE	Sig.
(Constant)	-1.989	1.879	.301	(Constant)	2.190	1.692	.202	(Constant)	14.945	5.759	.013
CAPTIVITY	.192	.416	.649	CAPTIVITY	-.360	.408	.383	CAPTIVITY	-.994	1.389	.478
WILD	.475	.466	.319	WILD	<b>1.229</b>	.499	.018	WILD	-1.744	1.699	.310
WILD_OTHERS	-.330	.701	.642	WILD_OTHERS	.221	.600	.715	WILD_OTHERS	.202	2.043	.922
ISSUE	.029	.131	.829	ISSUE	-.097	.114	.398	ISSUE	.303	.387	.439
UPDATED	.106	.161	.517	UPDATED	.185	.179	.307	UPDATED	-.541	.610	.381
GENDER	.235	.451	.606	GENDER	<b>-.923</b>	.449	.046	GENDER	<b>3.865</b>	1.530	.015
AGE	.011	.020	.593	AGE	.005	.018	.783	AGE	-.003	.062	.963
WOLFPRES	-.120	.454	.795	WOLFPRES	-.062	.451	.891	WOLFPRES	-.144	1.535	.926
OCCUPATION	-.165	.438	.710	OCCUPATION	-.349	.413	.403	OCCUPATION	-.282	1.405	.842
EDUCATION	.261	.208	.221	EDUCATION	-.098	.178	.586	EDUCATION	-1.006	.606	.104
CHILDREN	-.327	.567	.570	CHILDREN	.774	.533	.154	CHILDREN	-3.286	1.815	.077
PETDOGS	-.607	.374	.118	PETDOGS	.154	.376	.685	PETDOGS	1.131	1.281	.383
DAMAGE_OTHERS	.238	.705	.738	DAMAGE_OTHERS	.206	.683	.764	DAMAGE_OTHERS	1.745	2.323	.457
DAMAGE	-.249	.423	.562	DAMAGE	.143	.440	.747	DAMAGE	-.583	1.499	.699
LIVESTOCK	-.084	.084	.327	LIVESTOCK	.082	.068	.235	LIVESTOCK	.209	.232	.373
NLIVESTOCK	-.001	.001	.534	NLIVESTOCK	.001	.001	.355	NLIVESTOCK	.001	.004	.847
Observations	40				60				60		
R-squared	0.408				0.369				0.386		

B = Unstandardized Regression Coefficients

SE = Standard Errors

Table 21 - Influence of socio-economic factors and personal experience with wolves on attitudes, knowledge and fear of wolves among hunters. Results from linear regression analyses.

Independent Variables	ATTITUDES <sup>1</sup>			Independent Variables	KNOWLEDGE			Independent Variables	FEAR		
	B	SE	Sig.		B	SE	Sig.		B	SE	Sig.
(Constant)	1.817	2.049	.385	(Constant)	2.555	1.745	.152	(Constant)	4.437	5.317	.409
CAPTIVITY	.142	.631	.824	CAPTIVITY	.122	.521	.817	CAPTIVITY	-1.200	1.586	.454
WILD	.169	.538	.756	WILD	.513	.489	.301	WILD	-1.724	1.489	.254
WILD_OTHERS	-.255	.511	.622	WILD_OTHERS	-.471	.459	.312	WILD_OTHERS	2.785	1.399	.054
ISSUE	.017	.123	.891	ISSUE	.061	.109	.582	ISSUE	.007	.332	.982
UPDATED	.010	.120	.934	UPDATED	.101	.115	.385	UPDATED	.149	.351	.675
AGE	-.027	.025	.295	AGE	-.024	.022	.294	AGE	<b>.142</b>	.068	.042
WOLFPRES	.053	.524	.920	WOLFPRES	-.026	.445	.954	WOLFPRES	-1.330	1.355	.333
OCCUPATION	-.552	1.048	.603	OCCUPATION	.547	.905	.550	OCCUPATION	-2.355	2.757	.398
EDUCATION	-.125	.230	.592	EDUCATION	.123	.179	.497	EDUCATION	-.817	.545	.142
CHILDREN	-.268	1.375	.847	CHILDREN	.167	.680	.807	CHILDREN	2.951	2.070	.162
PETDOGS	-.810	.663	.234	PETDOGS	-.882	.527	.102	PETDOGS	3.052	1.605	.065
DAMAGE_OTHERS	-.140	.560	.805	DAMAGE_OTHERS	.175	.547	.751	DAMAGE_OTHERS	-1.561	1.667	.355
GROUND	.016	.207	.939	GROUND	<b>.304</b>	.143	.040	GROUND	-.172	.434	.695
HUNTDogs	.106	.769	.892	HUNTDogs	-.391	.628	.538	HUNTDogs	-1.513	1.914	.434
Observations	38				52				52		
R-squared	0.197				0.347				0.335		
Excluded variables	GENDER				GENDER				GENDER		

<sup>1</sup> The dependent variable (DV) was reflected before conducted the regression analysis, so that an increase in the DV means increase of attitudes.

B = Unstandardized Regression Coefficients

SE = Standard Errors

Table 22 - Influence of socio-economic factors and personal experience with wolves on attitudes, knowledge and fear of wolves among media workers.

Results from linear regression analyses.

Independent Variables	ATTITUDE			Independent Variables	KNOWLEDGE			Independent Variables	FEAR		
	B	SE	Sig.		B	SE	Sig.		B	SE	Sig.
(Constant)	-2.523	.637	.004	(Constant)	-2.545	8.033	.761	(Constant)	-1.119	11.641	.926
DAMAGE_OTHER S	<b>-1.746</b>	.268	.000	CAPTIVITY	1.544	1.530	.347	CAPTIVITY	-.554	2.218	.810
ISSUE	<b>.370</b>	.077	.001	WILD	1.236	2.123	.579	WILD	1.327	3.077	.679
WILD	<b>1.359</b>	.417	.012	WILD_OTHERS	-1.094	1.689	.538	WILD_OTHERS	-3.102	2.447	.245
<i>Model produced with Forward Stepwise.<sup>1</sup></i>				ISSUE	.329	.435	.474	ISSUE	-.998	.630	.157
				UPDATED	-.135	.541	.809	UPDATED	.965	.783	.258
				GENDER	1.297	1.839	.503	GENDER	-.874	2.665	.752
				AGE	.037	.060	.562	AGE	-.066	.088	.473
				EDUCATION	.291	1.059	.792	EDUCATION	2.186	1.535	.198
				CHILDREN	1.739	1.381	.249	CHILDREN	4.164	2.002	.076
				PETDOGS	.132	1.311	.923	PETDOGS	2.099	1.900	.306
				DAMAGE_OTHER S	-.589	1.828	.757	DAMAGE_OTHER S	4.412	2.649	.140
Observations	12				19				19		
R-squared	0.885				0.389				0.654		
Excluded variables	WOLFPRES, OCCUPATION				WOLFPRES, OCCUPATION				WOLFPRES, OCCUPATION		

B = Unstandardized Regression Coefficients

SE = Standard Errors

<sup>1</sup> Regression analyses could not produce a model using the method ENTER for inclusion of variables into the model. The method Forward Stepwise was used with a 0.05 probability of F for a variable to enter and 0.10 for removal of a variable. The model produced showed which variables are the most important in helping predicting the behavior of the dependent variable.

Table 23 - Influence of socio-economic factors and personal experience with wolves on attitudes, knowledge and fear of wolves among police officers. Results from linear regression analyses.

Independent Variables	ATTITUDES			Independent Variables	KNOWLEDGE			Independent Variables	FEAR		
	B	SE	Sig.		B	SE	Sig.		B	SE	Sig.
(Constant)	-2.239	1.579	.165	(Constant)	1.907	2.544	.457	(Constant)	6.302	4.989	.213
CAPTIVITY	-.222	.262	.403	CAPTIVITY	.515	.409	.214	CAPTIVITY	.214	.803	.791
WILD	.159	.328	.630	WILD	-.236	.469	.617	WILD	<b>-2.102</b>	.921	.027
WILD_OTHERS	.026	.256	.919	WILD_OTHERS	.812	.409	.053	WILD_OTHERS	.334	.818	.685
ISSUE	<b>.157</b>	.077	.050	ISSUE	-.093	.129	.476	ISSUE	-.170	.258	.512
UPDATED	.001	.076	.993	UPDATED	.211	.114	.070	UPDATED	-.242	.223	.284
GENDER	-.092	.839	.914	GENDER	1.071	1.094	.333	GENDER	1.654	2.150	.446
AGE	.015	.020	.471	AGE	.028	.033	.399	AGE	.070	.065	.286
CATEGORY	-.086	.153	.575	CATEGORY	<b>-.718</b>	.246	.005	CATEGORY	.067	.498	.893
WOLFPRES	.324	.395	.417	WOLFPRES	.633	.617	.310	WOLFPRES	.367	1.219	.765
EDUCATION	.375	.209	.082	EDUCATION	.179	.313	.571	EDUCATION	.348	.616	.576
CHILDREN	<b>-.781</b>	.274	.007	CHILDREN	-.410	.441	.357	CHILDREN	<b>2.731</b>	.873	.003
PETDOGS	.042	.241	.862	PETDOGS	.566	.395	.158	PETDOGS	-.714	.779	.364
DAMAGE_OTHERS	<b>-.979</b>	.292	.002	DAMAGE_OTHERS	-.444	.425	.302	DAMAGE_OTHERS	1.032	.838	.225
Observations	47				62				61		
R-squared	0.514				0.387				0.388		

B = Unstandardized Regression Coefficients

SE = Standard Errors

Results from regression analysis show that members of SEPNA have the highest knowledge about wolves and member of GNR are the least knowledgeable. These are good news because SEPNA is the police force more directly working with nature protection. However, we saw before that knowledge level among this interest group is still very low, and it can benefit from information campaigns targeted at reducing fear of wolves.

### **Fear**

Among police officers, fear of wolves is influenced by the experience of seeing wolves in the wild and the fact of having children. Fear is higher among respondents who have never seen a wolf in the wild and who have children. As seen before, the experience of seeing a wolf somehow helps people understanding that the species is not a threat for their personal safety. The negative attitude of police officers associated with the fact of having children is in conformity with this result, since these respondents also express the highest fear.

### **4.1.6. Identify the Issues and Type of Information to be Used in the Communication Campaign**

Results from Pearson correlation analyses show a few cases where significant correlations exist between attitudes toward wolves and knowledge about some wolf issues (Table 24). In the case of the general public and hunters, more positive attitudes are associated with correct answers to the item about the trend of the wolf population in Portugal. This means that people who know the real situation about wolf numbers have better opinions about the species. For these interest groups, an information campaign should focus on this issue.

Livestock owners do not have their attitudes toward wolves associated with any of the knowledge items analyzed in this study. As seen above, Fear seems to be an important factor affecting attitudes and any measure targeted at livestock owners should focus on reducing fear of wolves, whether in terms of their feelings about personal safety as well as in terms of the safety of the livestock. This interest group is a good example of how an information campaign designed at delivering messages about wolf biology (for example), might not be the best approach for improving attitudes. Other measures have to be designed for livestock owners, such as the support in implementing appropriate damage prevention measures.

Media workers with a positive vision of wolves have their opinions associated with a real perception of the impact of wolves on livestock. Those who incorrectly answered the question about the number of animals killed by wolves, have more negative attitudes toward the species. An information campaign with a strong focus on this issue might have good results in

improving opinions about wolves among this group. For the police officers results are different from other interest groups. The most negative opinions about wolves come from respondents who do not have an idea about the number of wolves that currently exist in the country or the average size of a wolf pack. They tend to overestimate these numbers, and their negative attitudes might be a reflection of those wrong beliefs. In addition, it is curious to see that a number of police officers sampled in this study do not know wolves are a protected species in Portugal. And those same respondents have a more negative attitude toward wolves than those who are aware of the legal status of the species. It is important to produce an information campaign that focus on these issues, because it can have a positive effect on police officers' opinions about wolves.

Table 24 – Results from the Pearson correlation coefficient between attitudes toward wolves and the various knowledge questions about wolves. A positive correlation means that more positive attitudes are associated with a question answered correctly.

Knowledge question	Interest Group				
	General Public <sup>2</sup>	Livestock Owners	Hunters	Media Workers	Police Officers
B1. How many wolves do you believe currently exist in Portugal?					$P = 0.431$ $p = 0.002$ $N = 51$
B2. Do you believe wolf numbers in Portugal are: increasing, decreasing, remaining the same.	$P = 0.194$ $p = 0.042$ $N = 110$		$P = 0.342$ $p = 0.035$ $N = 38$		
B7. Wolves are completely protected in Portugal.					$P = 0.335$ $p = 0.016$ $N = 51$
B9. How many sheep and goats do you think were killed by wolves last year in this municipality <sup>1</sup> ?				$P = 0.641$ $p = 0.025$ $N = 12$	
B12. What is the average pack size of wolves in Portugal?					$P = 0.278$ $p = 0.048$ $N = 51$

<sup>1</sup> Refers to the municipality where the respondents live.

<sup>2</sup> For the general public the attitudinal variable was reflected so that in increase in attitudes corresponds to a knowledge question answered correctly.

Overall, and besides these insights on the issues that an information campaign should focus on for each interest group, all knowledge items included in this study registered a high percentage of wrong answers. And very often, respondents from all interest groups did not know the answer to these questions. So, any information campaign should include very clear information about wolf biology, ecology, etc. and also information targeted at reducing fear

about the species. Fear is apparently a strong variable associated with negative attitudes, and respondents with children, in particular, feel a strong fear of the species. Messages and actions aimed at clarifying the public that wolves do not represent a threat to human safety might produce some good results in improving attitudes.

#### 4.1.7. Comparison of Attitudes, Knowledge and Fear of Wolves Among Interest Groups

##### 4.1.7.1. Comparison of attitudes among interest groups

Attitudes toward wolves are not significantly different among the general public and the various interest groups ( $F=0.117$ ;  $df=4$ ;  $p=0.977$ ). Results from ANOVA using the first component extracted with the PCA show that, in general, attitudes are similar among all respondents and very neutral.

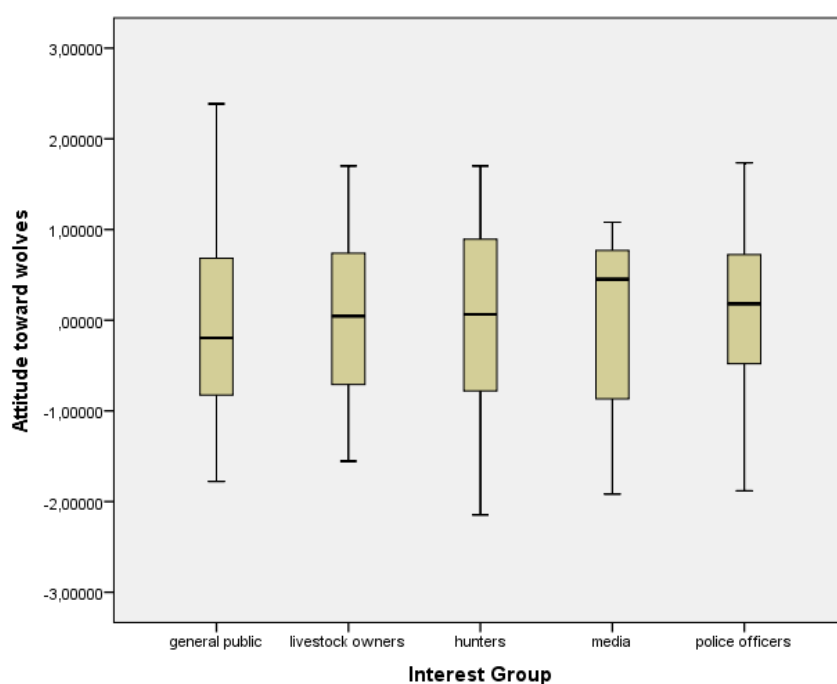


Figure 11 - Attitude average scores of the general public, livestock owners, hunters, media workers and police officers toward wolves.

The graph (Fig. 11) shows small differences between groups, with a more positive attitude among media workers, a more negative attitude among livestock owners, but the statistical tests tell us that these differences are not significant.

#### 4.1.7.2. Comparison of knowledge scores among interest groups

Knowledge about wolves is significantly different among the general public, livestock owners, hunters, media workers and police officers ( $F=7.512$ ;  $df=4$ ;  $p \leq .001$ ) (Table 25). The average scores range between 3.21 for the general public and 4.24 for livestock owners (Fig. 12), and do aggregate in subgroups according to Tukey's HSD test (Table 25).

Table 25 - Results from Tukey's HSD test, using knowledge scores about wolves from the general public, and the various interest groups.

Interest Group		N	Subset for alpha = 0.05		
			1	2	3
Tukey B	general public	150	3.21		
	media	20	3.35	3.35	
	police officers	73	3.92	3.92	3.92
	hunters	52		4.10	4.10
	livestock owners	62			4.24

The general public and the media workers aggregate in the subgroup with the lowest knowledge. Hunters and livestock owners aggregate in the subgroup with the highest knowledge. Police officers are in a central and overlapping position with the other two subgroups, and their average knowledge scores do not show a defined tendency.

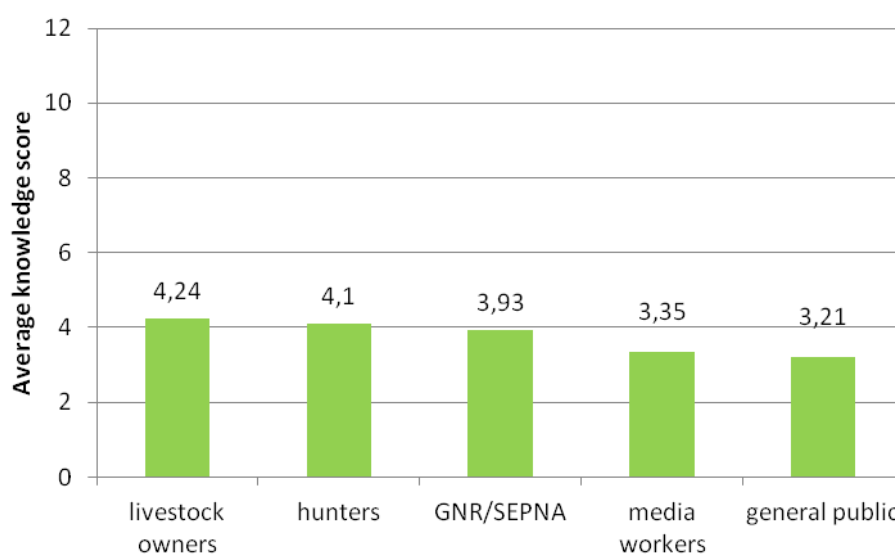


Figure 12 – Average knowledge scores about wolves among the general public and the various interest groups (knowledge scores ranging from 0 [low] to 12 [high]).



The group with the best results is livestock owners followed by hunters and police officers. The worst results are found among media workers and the general public which is at the lowest end of the knowledge scale.

The results show a low knowledge among all interest groups. Most respondents answered more than half of the questions incorrectly. Although livestock owners have the highest knowledge level about the species, the scores never reach the highest point of the scale (Fig. 13).

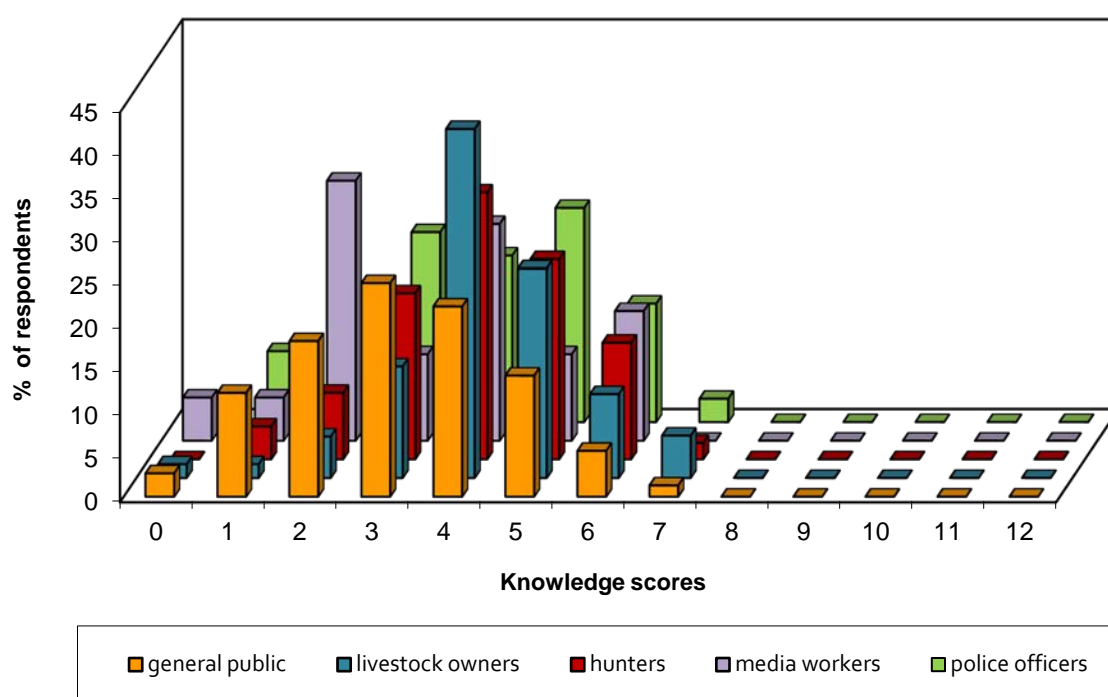


Figure 13 - Knowledge scores about wolves among the general public and the various interest groups (knowledge scores ranging from 0 [low] to 12 [high]).

#### 4.1.7.3. Responses to individual questions on knowledge about wolves

##### B1. How many wolves do you believe currently exist in Portugal?

Respondents from the general public, livestock owners and hunters answered incorrectly or do not know the answer to this question in 98-99% of the cases, and there is a tendency to overestimate the number of wolves they believe exist in the country. Only the livestock owners (n=2) refer a lower number of wolves than the real number. On a different note are media workers and police officers with 15% and 12% of correct answers, respectively.

**B2. Do you believe wolf numbers in Portugal are increasing, decreasing or remaining the same?**

Also here we can see that media workers and police officers are the ones who best know the correct answer (“remaining the same”), respectively 15% and 12%. However, most media workers (55%) believe wolf numbers in Portugal are decreasing, while a similar percentage of police officers believe they are increasing.

On the other interest groups, the correct answer only appears between 4% of the general public, and 8% of the livestock owners. When we analyze where most answers fall, there are interesting results. While the majority (45%) of the general public believes wolf numbers are in regression, most livestock owners (47%) and hunters (52%) think they are increasing. These results show that there might be different consequences in the way these people face the presence of wolves in the country.

**B3. How many wolves do you believe currently exist in this municipality\* (it refers to the municipality where the respondents live)?**

*\* media workers and police officers were asked to provide an answer based on the municipality where they work on a daily basis, and this municipality is the same where the interview was conducted. To the rest of the groups, the question applies to the location of residence.*

Data from the interest group were analyzed for each municipality separately because the correct answer to this question varies among municipalities.

The vast majority of the respondents in all interest groups does not know the answer or provide a wrong answer to this question. Only some members of the general public from Idanha-a-Nova gave correct answers, with 60% of them referring zero as the correct answer. Among livestock owners, only one individual from Almeida got close to the right estimate of wolf numbers in that municipality at the time of the interview (between 3 and 6 wolves). The rest of the livestock owners say not knowing the answer. Among hunters, there were 7% of correct answers in Almeida, 20% in Idanha-a-Nova and 7% in Sabugal.

Among media workers the level of incorrect answers is also high; there were 11% of correct answers in Guarda and 38% in the municipalities out of the study area, in radios and newspapers with some influence on the study area. In the case of the police officers, only 5% provided correct answers in the counties of Almeida and Guarda, and 45% in Idanha-a-Nova.

It is in the municipalities with no wolves or very few animals that we register more correct answers probably because it is easier to notice a long-term absence of wolves in a region than to notice their presence and know the size of the wolf population.

**B4. Do you believe wolf numbers in this municipality\* are increasing, decreasing or remaining the same?**

*\* media workers and police officers were asked to provide an answer based on the municipality where they work on a daily basis, and this municipality is the same where the interview was conducted. To the rest of the groups, the question applies to the location of residence.*

As in the previous question, data from the interest group were analyzed for each municipality separately because the correct answer to this question varies among municipalities.

In Almeida, Pinhel, Figueira de Castelo Rodrigo, Guarda and Sabugal we consider “increasing” as the correct answer, and in Penamacor and Idanha-a-Nova we consider the right answer “remaining the same”, because in these two municipalities the wolf presence has been null or very sporadic in the last years.

Among the general public, Almeida registers the higher percentage (50%) of correct answers, followed by Pinhel (32%), Idanha-a-Nova (25%), Sabugal (17%), Guarda (16%) and Figueira de Castelo Rodrigo (8%). Livestock owners show a clear increase in the number of correct answers in comparison with other interest groups, regarding their knowledge about the tendency of the wolf population in their municipality (83% in Pinhel and 64% in Almeida, followed by Idanha-a-Nova (50%), Figueira de Castelo Rodrigo (44%) and Sabugal (29%). In Penamacor, livestock owners say there are no wolves and there was a recent decrease in the wolf population.

Interestingly, livestock owners from Guarda believe wolf numbers are decreasing, although there were several recent news in the local and national press about flocks of livestock being attacked by wolves.

Regarding hunters, Pinhel shows up again as the municipality where more respondents gave correct answers (78%), followed by Guarda (50%), Almeida (33%), Sabugal (29%) and Idanha-a-Nova (20%). In Figueira de Castelo Rodrigo no one answered correctly. Among media workers, most respondents do not know the answer. Only Guarda and Pinhel had some correct answers as well as a few municipalities where some interviews were conducted with radios and newspapers with influence in the study area. Police officers from Guarda know the

right answer in 67% of the cases, followed by Almeida and Pinhel with equal percentages (50%), Idanha-a-Nova (27%) and Penamacor (17%).

**B5. How much does the average adult male wolf weigh in Portugal?**

In all interest groups there were between 35% (general public) and 45% (media workers) of correct answers (21-40 kg). The option that received the highest number of responses was 41-60 kg which shows that most people tend to overestimate the weight of an adult male wolf.

**B6. There used to be wolves throughout this (where respondent lives) entire municipality.**

The vast majority of respondents in all interest groups answered correctly to this question, answering affirmatively. In the case of hunters, the percentage of correct answers reached 92%. Only the media workers got lower percentages (65% of correct answers).

**B7. Wolves are completely protected in Portugal.**

As in the previous question, most respondents answered correctly and know the legal protection status of the Iberian wolf in Portugal. Hunters (92%) and livestock owners (87%) are the interest groups who best know the situation. Media workers, once again, register low percentages of correct answers (35%), in comparison with the other groups.

**B8. Is it generally true that only two members of a wolf pack breed in any one year?**

Hunters and police officers answer YES to this question in 25% of the cases, thus being the groups with the highest percentage of correct answers. These are followed by livestock owners and the general public, respectively with 15% and 11%. The worst results are again among media workers, with only 5% of correct answers.

**B9. How many sheep and goats do you think were killed by wolves last year in this municipality\*?**

*\* media workers and police officers were asked to provide an answer based on the municipality where they work on a daily basis, and this municipality is the same where the interview was conducted. To the rest of the groups, the question applies to the location of residence.*

In general terms, there are percentages of correct answers between 8% and 12% in all groups, except for media workers. Only in Idanha-a-Nova and Penamacor the public seems to

know the number of animals killed by wolves, *i.e.*, they refer the number zero, which is in accordance with the fact of knowing there are no wolves in that region. In the other municipalities, no one got close to a real estimate of the damage caused by wolves to livestock. The same happens with livestock owners, hunters and police officers.

However, media workers from Guarda and the surrounding municipalities to the study area, stand out with 50% of correct answers. This might be related to the fact that they consistently give a strong coverage to events related to wolves attacking livestock.

**B10. Wolves kill sheep and goats only if there is not enough wild game.**

The correct answer to this question is FALSE. Livestock owners and hunters are the ones who better know this fact, providing right answers in 82% and 64% of the times, respectively. These are followed by the general public (49%), police officers (37%) and media workers who only gave the correct answer 15% of the times.

**B11. How often is a wolf generally able to kill wild prey?**

Hunters are the respondents with the highest rate of correct answers (14%) although this number is considerably low. The next groups are the general public (10%), livestock owners (5%), media workers (5%) and police officers (1%).

In all groups, most people say no knowing the answer or points the option “one each 10 attempts” as the right answer. This shows that people tend to see the wolf as a species with a higher predatory success rate than it real has. In average, a wolf only gets its prey one in each 20 attempts.

**B12. What is the average pack size of wolves in Portugal?**

Considering that the right answer is “1-5 wolves”, the hunters and the general public are the groups with the lowest rates of correct answers (respectively 23% and 27%). With no significant differences between the groups, media workers (35%), police officers (36%) and livestock owners (40%) present higher numbers of correct answers.

In all groups, most respondents say not knowing the answer or select, as the right response, the option “6-10 wolves”; this shows that people tend to believe wolf packs are bigger than they actually are.

Although there were significant differences in knowledge levels among the interest groups, all these differences between the groups, analyzed question by question, provide a better

insight on the type of information to be delivered specifically to each group in order to improve knowledge about wolves.

#### 4.1.7.4. Comparison of fear scores among interest groups

Fear of wolves is significantly different among the general public, livestock owners, hunters, media workers and police officers ( $F=9.628$ ;  $df=4$ ;  $p \leq .001$ ) (Table 26). The average scores range between 8.06 for hunters and 11.57 for the general public (Fig. 14), and do aggregate in subgroups according to Tukey's HSD test (Table 26).

Table 26 - Results from Tukey's HSD test, using fear scores about wolves from the general public, and the various interest groups.

Interest Group		N	Subset for alpha = 0.05	
			1	2
Tukey B	Hunters	52	8.06	
	livestock owners	62	9.89	9.89
	police officers	71	9.90	9.90
	media workers	20		10.50
	general public	148		11.57

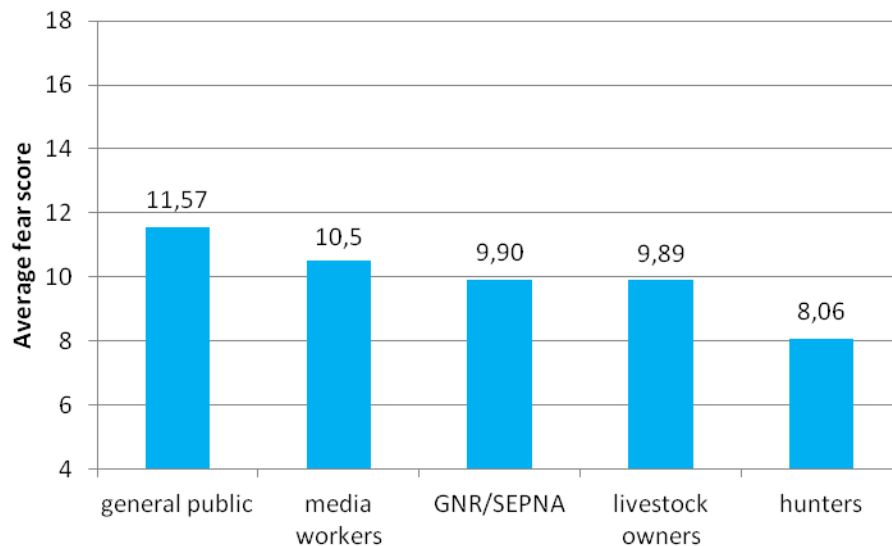


Figure 14 – Average fear scores about wolves among the general public and the various interest groups (fear scores ranging from 4 [low] to 18 [high]).

Hunters, livestock owners and police officers aggregate in the subgroup with the lowest fear. The general public and the media workers aggregate in the subgroup with the highest fear. Police officers and livestock owners are in a central and overlapping position with the two subgroups, and their average fear scores do not show a defined tendency. The respondents with the strongest fear are the general public followed by media workers and police officers. The lowest fear is found among hunters and livestock owners which might be related to the fact these two interest groups are more frequently in the field and in contact with wolves. Somehow this contact reduces fear of the species.

Analysing the frequency plot (Fig. 15) we can see that none of the groups shows a strong consistency of their individuals toward one end of the fear scale. Respondents seem to spread along the spectrum of fear because answers to questions about fear are quite different. However, while the top of the knowledge scale did not registered any respondents, the top of the fear scale has many respondents, which means that fear is strong among many respondents sampled in this study, namely the general public, media workers and police officers, as seen above.

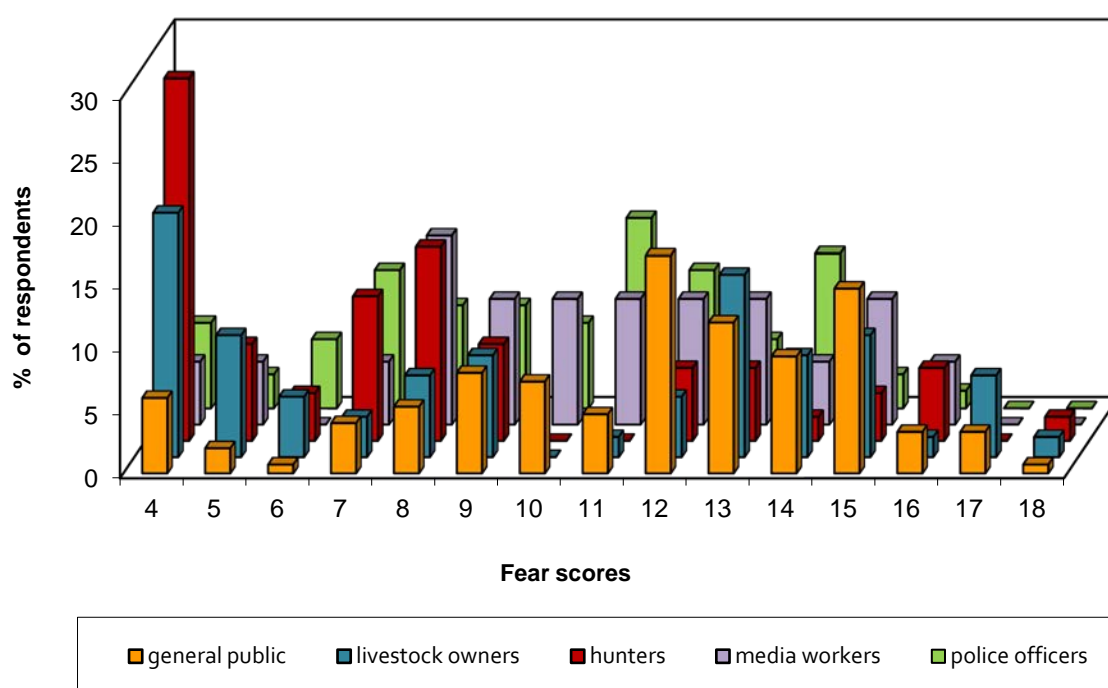


Figure 15 - Fear scores about wolves among the general public and the various interest groups (fear scores ranging from 4 [low] to 18 [high]).

## **4.1.8. Comparison of Attitudes, Knowledge and Fear of Wolves Between the North and South regions of the Study Area**

### **4.1.8.1. Comparison of attitudes between the north and south of the study area**

Attitudes toward wolves of respondents sampled are not significantly different between the northern and the southern parts of the study area ( $F=0.619$ ;  $df=243$ ;  $p=0.742$ ). The T Tests conducted for each interest group separately gave the same results, which means that attitudes are similar in areas with wolves (north: Figueira de Castelo Rodrigo, Pinhel, Almeida, Guarda and Sabugal) and areas with no wolves (south: Penamacor and Idanha-a-Nova). Results from regression analysis presented before show that, for the general public, the fact of living in Sabugal is associated with more negative attitudes toward wolves, but in general terms, for the general public, there are no differences in attitudes between the north and the south areas.

### **4.1.8.2. Comparison of knowledge scores between the north and south of the study area**

Knowledge about wolves of respondents sampled is not significantly different between the northern and the southern parts of the study area ( $F=5.353$ ;  $df=345$ ;  $p=0.078$ ). Although knowledge is, in average, higher in the south, the difference from the north is not significant. Similar results were found for livestock owners, hunters, media workers and police officers. The exception is the general public which shows significantly different results in knowledge ( $F=6.642$ ;  $df=148$ ;  $p=0.010$ ) between north (average score = 3.82) and south (average score = 3.04). Respondents in the south are more knowledgeable about the species than in the north, although there are no wolves in the south.

### **4.1.8.3. Comparison of fear scores between the north and south of the study area**

Fear of wolves of respondents sampled is not significantly different between the northern and the southern parts of the study area ( $F=0.025$ ;  $df=341$ ;  $p=0.352$ ). The T Tests conducted for each interest group separately gave the same results which means that fear of wolves is similar in areas with wolves (north) and areas with no wolves (south).

Overall, we can say that there are no significant differences in attitudes, knowledge and fear of wolves between the northern and southern parts of the study area.



#### **4.1.8.4. Comparison of attitudes toward wolves between the study area and other parts of Portugal sampled in other studies**

Results from ANOVA for comparison of data from Aveiro/Viseu, Vila Real and the study area, show that attitudes from the general public toward wolves are not significantly different between these regions ( $F=0.158$ ;  $df=3$ ;  $p=0.925$ ).

#### **4.1.8.5. Comparison of attitudes toward wolves in the study area today and some years ago**

The T Test was used for comparison of data collected in the county of Guarda in 2002 with data from the northern parts of the study area (municipalities that correspond to the county of Guarda) in 2013. Results show that there are not significant differences ( $F=0.627$ ;  $df=519$ ;  $p=0.545$ ).

The same test was used for comparison of data collected in the county of Castelo Branco in 2002 with data from the southern part of the study area (municipalities that correspond to the county of Castelo Branco) in 2013. Results show that there are no significant differences ( $F=1.175$ ;  $df=361$ ;  $p=0.673$ ). Overall, we can say that attitudes toward wolves are very similar in these same regions in 2002 and in 2013. The general public from the counties of Guarda and Castelo Branco maintained their opinions after more than a decade. The next opinion poll conducted under the project Med Wolf in 2016 will show if changes in attitudes will occur after various management measures implemented with this project.

The following graph (Fig. 16), with all the subgroups of data collected in different regions and at different points in time, show slight differences in attitudes but the statistical tests tell us these differences are not significant. Overall, opinions about wolves among the general public are close to neutral or slightly negative, but very similar and stable in all these regions and timeframes.

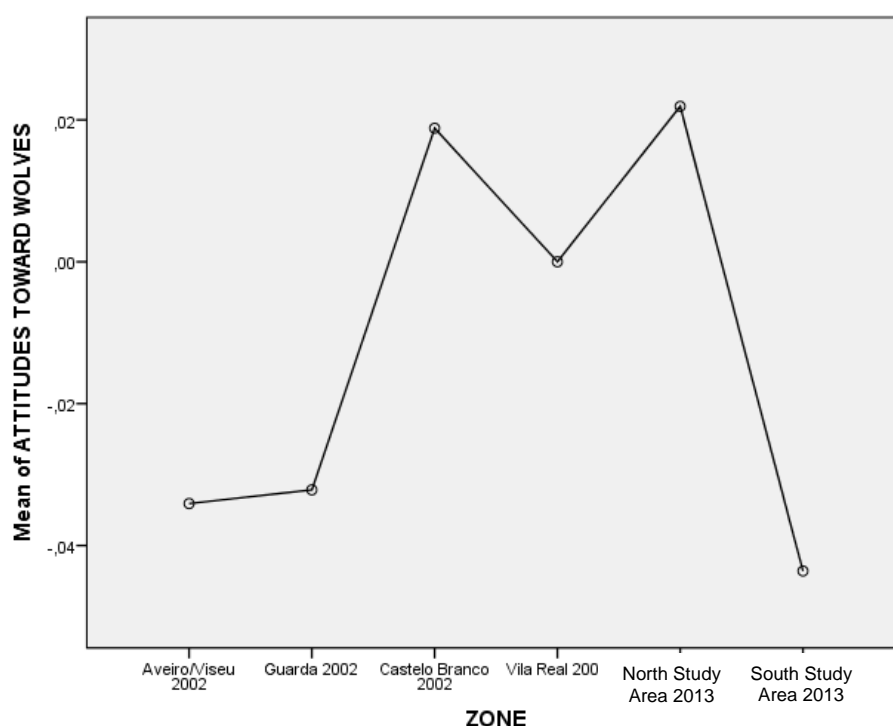


Figure 16 – Average scores of attitudes toward wolves among the general public in different regions and timeframes collected in Portugal.

## 5. Conclusions

The results obtained within this action allowed the accomplishment of the objectives of the action. The average scores of attitudes are similar among the interest groups, which mean that there are no significant differences in attitudes between regions, neither inside the same region across time. Overall, opinions about wolves among the general public are close to neutral or slightly negative, but very similar and stable in all these regions and timeframes.

It is generally accepted that positive attitudes toward wolves are linked with higher knowledge levels about the species, but among specific interest groups, attitudes cannot be improved just by providing information on wolf biology or ecology, through education programmes. Livestock owners are one of the interest groups where positive attitudes and the willingness to accept wolves depend on finding management measures that most interest groups agree with, without compromising wolf conservation and interest groups needs.

However, it is important to notice the importance of information campaigns targeted at improving general public's knowledge about wolves. We saw that low knowledge levels are linked with negative attitudes toward wolves among the general public. So, by increasing their knowledge on the size of the wolf population, aspects of wolf biology, impact on livestock and wild prey, facts showing that wolves do not attack humans, etc., we expect to

reduce fear of the species. By reducing fear, we might expect to improve attitudes toward wolves.

The general public has a neutral or slightly negative opinion toward wolves and shows some acceptance of the species. Among hunters we also found neutral opinions, although many hunters agree with lethal control and hunting wolves. Some authors state that, traditionally, wolf managers and researchers have focused on documenting attitudes and when they were found to be negative, the objective became one of changing them towards a more positive note (Majic & Bath 2010). In fact, finding neutral attitudes has been seen as an opportunity to influence those views toward more positive viewpoints (Majic & Bath 2010). The results of these authors' research would suggest this might not be beneficial, as neutral attitudes may indicate less conflict. Attitudes should therefore be considered more as indicators of the current situation and not as objects to be directly influenced through awareness campaigns (Majic & Bath 2010). Attitudinal studies are needed to understand the nature of conflicts, but instead of focusing on changing the attitudes afterwards, it is better to focus on a resolution of the underlying conflict (Majic & Bath 2010).

In this study, we tend to believe that for some interest groups, negative attitudes are not a sign of strong conflict with wolves. Instead, they might be a sign of lack of information and an information campaign can improve their attitudes. Media workers and police officers are two of these groups. They are not directly or indirectly affected by the presence of wolves in the region but have the power to easily influence public opinion about wolves. Results show that there is a group of media workers in favour of lethal control of wolves. Although they are a minority, they agree that wolf hunting should be legal and that wolves should be killed by all means, even with snares and poison. It is very important for managers to have a clear picture of these details, since media workers can have an important role in changing attitudes of the public through powerful messages in the press. The generally weak attitudes of the general public suggest that large segments of the public might change attitudes rapidly to widely publicized event (Ericsson & Heberlein 2003). A very negative group of media workers can send inaccurate and extremely negative information about wolves in a local or regional newspaper, and this can represent a serious threat to wolf conservation efforts being done locally. This study shows that a majority of the general public holds a moderately negative opinion about wolves. These media workers can change public's attitudes easily to the lower end of the attitude scale, with negative news about wolves, and shift to a strongly negative attitude. This sector of the media must be under the scope of a powerful information

campaign about wolves, which will contribute towards the success of any wolf conservation project.

The majority of the media workers sampled in this study are slightly negative toward wolves because they believe wolves cause abundant damage to livestock. This finding helps defining the right message to include in the communication campaign. It is important that media workers fully understand the real impact of wolves to livestock, which can affect the type of messages and news written by this interest group on the press. In the study area, and very often across the country, we see negative and inaccurate news about wolf attacks to domestic animals, always showing the wolf as an evil creature, without considering the point of view of conservationists or the accurate data collected by biologists or government entities.

Among police officers there is a significant percentage of respondents who moderately agree with extreme and illegal measures for controlling wolf numbers, like the usage of snares and poison. This is a controversial and serious problem that has to be dealt with an information campaign and meetings/workshops with this interest group. Information campaigns designed for police officers should focus particularly on: a) former forest rangers because they have low knowledge about wolves; and, b) young individuals from SEPNA, with small children, because these are the ones with the most fear and the worst opinion about wolves, and the ones who will continue working on nature protection for the next decades. Information delivered to police officers should include topics about the legal status of the species, the fact that wolves do not represent a threat to human safety and data about the low damage caused by wolves to livestock.

Although is generally accepted in the literature that positive attitudes toward wolves are linked with higher knowledge levels about the species, among specific interest groups attitudes cannot be improved just by providing information on wolf biology or ecology, through education programmes or information campaigns. When attitudes are not linked with knowledge, there seems to be some association between knowledge about wolves and fear. These actions have to be designed in detail for each interest group, addressing the gaps of knowledge more directly targeted at reducing fear and consequently improving attitudes, as in the case of hunters.

Hunters agree that wolves should exist and have a very neutral position about this issue, but many agree that wolf hunting should be allowed and agree with the lethal control of wolf numbers. They believe wolves cause much damage to livestock although they do not see the wolf as a serious threat to game species. In opposition to the general public hunters are not in favour of compensations paid to livestock owners, and this shows the complexity of this kind

of issues. Payment of compensations is certainly a controversial issue and interest groups have different positions.

In previous studies done in the region, the public does not agree with livestock owners receiving money for living in a zone where there are wolves instead of receiving compensation for losses that wolf causes. Data from this study shows different opinions and people are more in favour of the second option. Comments from the respondents gathered by the interviewer show some probable causes for this position. People mentioned they see livestock owners already being subsidized for having livestock and are more in favour of seeing the government helping livestock owners implementing measures to prevent damage caused by wolf attacks. These types of management options are difficult to implement. Certainly, compensation options are controversial issues and it is difficult to undertake consensual decision-making. The discussion of these issues with the interest groups is something essential in a wolf management process. Identifying major sources of conflicts between the interest groups before taking decisions is an important step toward working with the conflicting groups and achieving consensual solutions more easily. Most of the times, negative attitudes are due to conflicts of values or behavioural conflicts between interest groups, not due to conflicts between humans and wolves.

In terms of changes in attitudes over time, Williams *et al.* (2002) in their quantitative meta-analysis found that public attitudes toward wolves have been stable over the last 30 years. In Utah, Bruskotter *et al.* (2007) similarly found that attitudes toward wolves did not change over the past decade. Our results indicate the same stability in attitudes in the study area but provide a good baseline assessment for measuring any change in attitudes in 2016, after the implementation of several management measures and an information and education campaign.

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# **Appendix**

## **QUESTIONNAIRE**

## **Opinião e conhecimentos sobre o lobo-ibérico na zona raiana da Beira Interior**

Portugal e Itália estão a desenvolver um projecto co-financiado pela União Europeia, com o título “Acções de Boas Práticas para a Conservação do Lobo em Áreas Mediterrânicas”, e cujo objectivo é promover uma presença estável do lobo em áreas rurais em países da Europa Mediterrânica onde os hábitos de coexistência se têm perdido, através do desenvolvimento de estudos e de medidas que permitam a redução de conflitos com as actividades humanas. O presente inquérito faz parte de uma das muitas acções deste projecto, e destina-se a conhecer a opinião e o nível de conhecimentos dos portugueses acerca do lobo-ibérico, na zona raiana da Beira Interior, em 2013 e depois novamente em 2016.

Agradecemos a sua disponibilidade para responder ao seguinte questionário da forma mais completa e sincera possível. As suas respostas, juntamente com as de centenas de outras pessoas, fornecerão dados muito importantes sobre o que pensam os portugueses acerca dos lobos. Todas as respostas, quer sejam a favor, contra, ou neutras, são muito importantes, e encorajamo-lo(a) a responder a todas as perguntas. As suas respostas serão agrupadas com as de outras pessoas, e permanecerão estritamente confidenciais. Este questionário é totalmente anónimo. Por favor, responda às questões abertamente e não escreva o seu nome. Obrigado por aceitar participar neste importante estudo.

Com os melhores cumprimentos,

Clara Espírito Santo  
Assistente do projecto



**SECÇÃO A:** As primeiras questões são sobre o que pensa acerca dos lobos. Por favor, coloque um círculo na resposta que melhor descreve a sua opinião.

**1. Qual a resposta que melhor descreve a sua opinião acerca dos lobos?**

- |                           |                          |
|---------------------------|--------------------------|
| a) completamente contra   | d) moderadamente a favor |
| b) moderadamente contra   | e) completamente a favor |
| c) nem a favor nem contra |                          |

**2. Haver lobos em Portugal é:**

- |              |              |                |
|--------------|--------------|----------------|
| a) muito mau | b) mau       | c) indiferente |
| d) bom       | e) muito bom |                |

De seguida, é listada uma série de frases. Por favor, coloque um círculo na resposta que melhor descreve a sua opinião utilizando a seguinte escala:  
**1=Discordo absolutamente; 2=Discordo; 3=Sem opinião; 4=Concordo; 5=Concordo absolutamente**

	Discordo absolutamente	Discordo	Sem opinião	Concordo	Concordo absolutamente
<b>3. É importante manter as populações de lobos em Portugal, para as gerações futuras.</b>	1	2	3	4	5
<b>4. Devemos assegurar a existência de uma população abundante de lobos para as gerações futuras.</b>	1	2	3	4	5
<b>5. Quer tenha ou não a oportunidade de ver um lobo, é importante para si que eles existam em Portugal.</b>	1	2	3	4	5
<b>6. Os lobos têm um grande impacto na caça grossa.</b>	1	2	3	4	5
<b>7. Os lobos têm um grande impacto na caça menor.</b>	1	2	3	4	5
<b>8. Os lobos reduzem as populações de corço e javali a níveis inaceitáveis.</b>	1	2	3	4	5
<b>9. É desnecessário haver lobos neste concelho, se já existirem populações abundantes em outras regiões de Portugal.</b>	1	2	3	4	5
<b>10. É desnecessário haver lobos em Portugal, se já existirem populações abundantes em outros países da Europa.</b>	1	2	3	4	5
<b>11. Os lobos devem ser uma espécie totalmente protegida por lei em Portugal.</b>	1	2	3	4	5
<b>12. Deveria ser autorizada a caça aos lobos em épocas de caça específicas.</b>	1	2	3	4	5
<b>13. Deveria ser autorizada a caça aos lobos durante todo o ano.</b>	1	2	3	4	5

	Discordo absolutamente	Discordo	Sem opinião	Concordo	Concordo absolutamente
14. Os lobos deveriam ser mortos usando qualquer método, incluindo o uso de laços ou de veneno.	1	2	3	4	5
15. Os lobos ajudam a manter as populações de corço e javali em equilíbrio.	1	2	3	4	5
16. A existência de lobos neste concelho pode aumentar o turismo.	1	2	3	4	5
17. Os lobos causam muitos prejuízos no gado.	1	2	3	4	5
18. Em áreas nas quais os lobos vivem muito perto das povoações, os ataques a seres humanos são frequentes.	1	2	3	4	5
19. Em áreas nas quais os lobos vivem perto do gado, a sua principal fonte de alimento é o gado.	1	2	3	4	5
20. Teria medo de caminhar no mato se aí existissem lobos.	1	2	3	4	5
21. Ficaria preocupado com a sua segurança pessoal ou a da sua família se houvesse lobos perto da sua residência.	1	2	3	4	5
22. Os lobos têm o direito de existir como qualquer outra espécie.	1	2	3	4	5
23. Na sua opinião, qual o animal mais perigoso para os seres humanos?					
a) Lobo					
b) Lince					
c) Javali					
d) Cães vadios					
e) Todos são igualmente perigosos					
f) Nenhum é perigoso					

**SECÇÃO B:** As questões seguintes referem-se aos seus conhecimentos gerais acerca dos lobos. Por favor, assinale com um círculo a resposta que melhor responde à questão.

1. Quantos lobos acha que existem actualmente em Portugal? \_\_\_\_\_ lobos
2. Acha que o número de lobos em Portugal está a:
  - a) aumentar
  - b) diminuir
  - c) manter-se constante
3. Quantos lobos acha que existem actualmente neste concelho? \_\_\_\_\_ lobos
4. Acha que o número de lobos neste concelho está a:
  - a) aumentar
  - b) diminuir
  - c) manter-se constante

**5. Quanto pesa, em média, um lobo macho adulto em Portugal?**

- a) 1-20 Kg
- b) 21-40 Kg
- c) 41-60 Kg
- d) mais de 60 Kg
- e) não sei

**6. Costumava haver lobos em todo este concelho antigamente?**

- a) sim
- b) não
- c) não tenho a certeza

**7. Os lobos são uma espécie completamente protegida por lei em Portugal?**

- a) sim
- b) não
- c) não tenho a certeza

**8. É verdade que, geralmente, apenas dois lobos da alcateia (grupo familiar) se reproduzem num ano?**

- a) sim
- b) não
- c) não tenho a certeza

**9. Quantas ovelhas e cabras acha que foram mortas por lobos no ano passado neste concelho?**

\_\_\_\_\_ ovelhas e cabras

**10. Os lobos matam ovelhas e cabras apenas se não houver animais selvagens suficientes.**

- a) verdadeiro
- b) falso
- c) não tenho a certeza

**11. Com que frequência é que um lobo captura com sucesso um animal selvagem?**

- a) em todas as situações
- b) uma em cada 2 tentativas
- c) uma em cada 10 tentativas
- d) uma em cada 20 tentativas
- e) não tenho a certeza

**12. Qual é o tamanho médio de uma alcateia de lobos em Portugal?**

- a) 1-5 lobos
- b) 6-10 lobos
- c) 11-20 lobos
- d) mais de 20 lobos
- e) não tenho a certeza

**SECÇÃO C:** Estas últimas questões procuram retratar a sua opinião acerca de várias medidas de conservação ou controlo dos lobos e sobre a sua atitude para com este animal. Por favor, coloque um círculo na resposta que melhor descreve a sua opinião utilizando a seguinte escala:

**1=Discordo absolutamente; 2=Discordo; 3=Sem opinião; 4=Concordo; 5=Concordo absolutamente**

	Discordo absolutamente	Discordo	Sem opinião	Concordo	Concordo absolutamente
<b>1. O número de lobos em Portugal deveria aumentar.</b>	1	2	3	4	5

Se discorda ou discorda absolutamente, qual a principal razão para não querer que o número de lobos aumente em Portugal?

Se concorda ou concorda absolutamente, qual a principal razão para querer que o número de lobos aumente em Portugal?

	Discordo absolutamente	Discordo	Sem opinião	Concordo	Concordo absolutamente
2. Se um lobo matar gado, concordo que se deva abater esse lobo.	1	2	3	4	5
3. Gostaria de contribuir com dinheiro para um programa de compensação para os criadores de gado com prejuízos causados pelos lobos.	1	2	3	4	5
4. Já existem suficientes lobos em Portugal.	1	2	3	4	5
5. Os proprietários de gado deveriam receber dinheiro por viverem numa zona onde existem lobos, em vez de lhes serem pagos os prejuízos causados pelos lobos.	1	2	3	4	5
6. Os proprietários de gado deveriam receber dinheiro pelos prejuízos causados pelos lobos, apenas se usassem medidas para prevenir os ataques, como por exemplo cães de gado.	1	2	3	4	5
7. Os proprietários de gado que perdem animais devido aos ataques de lobos devem ser compensados.	1	2	3	4	5

Se *concorda* ou *concorda absolutamente* com a anterior frase nº 7, por favor responda às seguintes questões de a) a f). Se *discorda* ou *discorda absolutamente* ou se é *sem opinião* na frase nº 7, por favor passe para a SECÇÃO D. Obrigado.

a) Gostaria que parte dos seus impostos fosse usada no pagamento dos prejuízos causados pelos lobos.	1	2	3	4	5
b) O Estado deve pagar os prejuízos causados pelos lobos aos proprietários de gado.	1	2	3	4	5
c) Os proprietários de gado deveriam ser obrigados a fazer seguros contra os ataques de lobos.	1	2	3	4	5
d) O Estado deveria pagar estes seguros aos proprietários de gado.	1	2	3	4	5
e) Deveria haver batidas aos lobos autorizadas em Portugal.	1	2	3	4	5
f) O Estado deveria ajudar os proprietários de gado a implementar medidas de prevenção dos ataques (vedações, currais, bons cães de gado, etc.).	1	2	3	4	5

**SECÇÃO D:** As questões seguintes são sobre alguma experiência que já tenha tido com lobos.

**1. Alguma vez viu um lobo em cativeiro?**

- a) sim                                      b) não                                      c) não tenho a certeza

**2. Alguma vez viu um lobo vivo em liberdade?**

- a) sim                                      b) não                                      c) não tenho a certeza

**3. Se respondeu sim na pergunta anterior, por favor indique:**

- a) local \_\_\_\_\_ b) data \_\_\_\_\_ c) número de lobos \_\_\_\_\_

**4. Conhece alguém que tenha visto lobos?**

- a) sim                                      b) não                                      c) não tenho a certeza

**5. Se respondeu sim na pergunta anterior, por favor indique:**

- a) local \_\_\_\_\_ b) data \_\_\_\_\_ c) número de lobos \_\_\_\_\_

**6. Numa escala de 1 a 10, que importância tem para si o assunto da gestão dos lobos em Portugal?**

Nada importante                      1   2   3   4   5   6   7   8   9   10                      Extremamente importante

**7. Numa escala de 1 a 10, que importância tem para si manter-se bem informado acerca do assunto da gestão dos lobos em Portugal?**

Nada importante                      1   2   3   4   5   6   7   8   9   10                      Extremamente importante

**SECÇÃO E:** Dados pessoais: (Todas as informações são confidenciais)

**I. Género**

- a) Feminino                                      b) Masculino

**II. Idade:** \_\_\_\_\_

**III. Local de residência:** freguesia \_\_\_\_\_ concelho \_\_\_\_\_

**IV. Profissão** \_\_\_\_\_

**V. Grau de escolaridade:**

- |  |                                      |
|--|--------------------------------------|
| a) sem formação escolar                          | e) ensino secundário (10º - 12º ano) |
| b) instrução primária                            | f) bacharelato ou licenciatura       |
| c) ensino básico – 2º ciclo (ciclo preparatório) | g) pós-graduação                     |
| d) ensino básico – 3º ciclo (7º - 9º ano)        |                                      |

**VI. Tem crianças, com menos de 13 anos de idade?** a) sim b) não

**VII. Qual o último ano em que caçou?**

- a) ano: \_\_\_\_\_ b) não sei c) nunca caçou

**VIII. Se for caçador, em que tipo de zona é que caça?**

- |                |              |                       |
|----------------|--------------|-----------------------|
| a) municipal   | b) nacional  | c) regime livre       |
| d) associativa | e) turística | f) outra. Qual? _____ |

**IX. Tem cães de caça?** a) sim b) não

**X. Tem cães de estimação (animal de companhia)?** a) sim b) não

**XI. Se for proprietário de gado, que tipo de gado tem? (assinale todas as respostas necessárias)**

- |            |                |
|------------|----------------|
| a) ovino   | c) bovino      |
| b) caprino | d) outro _____ |

**XII. Já teve prejuízos causados pelos lobos?**

- a) Sim b) Não c) não sei

**XIII. Se respondeu sim na pergunta anterior, por favor indique:**

- a) local \_\_\_\_\_ b) data \_\_\_\_\_ c) o Estado pagou-lhe? Sim\_\_ Não \_\_

**XIV. Conhece alguém que já tenha tido prejuízos causados pelos lobos?**

- a) sim b) não c) não sei

**XV. Se respondeu sim na pergunta anterior, por favor indique:**

- a) local \_\_\_\_\_ b) data \_\_\_\_\_ c) o Estado pagou-lhe? Sim\_\_ Não \_\_

**Obrigada pela sua cooperação. Se tiver algum comentário a fazer acerca deste assunto ou em relação ao questionário, por favor escreva-o no espaço seguinte.**

Data: \_\_\_\_ / \_\_\_\_ / \_\_\_\_