



Short communication

Changes in attitudes toward wolves in Croatia

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ABSTRACT

Against a background of an evolving wolf policy process we carried out personal structured interviews with residents of three regions within Croatian wolf range in 1999 ($n = 1209$) and repeated the study, using the same methodology in 2003 ($n = 1172$). We documented a change in public support for wolf conservation and support for control of wolves. The change was a result of a real change in attitudes and not of a change in the age structure of the sampled population. The changes were documented in the two southern regions, Lika and Dalmatia, with attitudes shifting towards a more neutral viewpoint, as there was a decrease in support for wolf conservation and a decrease in support to control wolves. It seems that different birth cohorts react differently to conservation activities. In 1999, the younger cohort groups may have been influenced more by the legal protection campaign. The older cohorts reacted more sympathetically to livestock concerns and thus held stronger negative attitudes toward wolves. Using human dimensions research as an evaluative tool can help large carnivore managers be more adaptive and thus effective in their management solutions.

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1. Introduction

Most human dimensions in wildlife management research are case studies reporting results from only one point in time. Human dimensions research on large carnivores is no exception. As an applied and still relatively recent field of study, often driven by crisis management (Bath, 1998), this is not surprising. Due to this traditional focus of human dimensions research, studies have rarely explored the subject of attitude change and rarely have been able to capture changes in attitudes over time (Williams et al., 2002). Many researchers (e.g. Manfredo et al., 1998; McComas and Scherer, 1999; Kaczensky et al., 2001) have called for the need to conduct longitudinal research and to begin attitudinal and belief monitoring.

Today in many places large carnivores are increasing in numbers and range and returning to previous areas where they were once exterminated. In those areas opportunities exist for scientists to document existing attitudes and subsequent attitude change. Changes are likely to occur as carnivore-livestock conflicts increase, policy changes occur, awareness campaigns are delivered, and carnivore-livestock damage prevention programs are implemented. For example, Zimmermann et al. (2001) found by reviewing attitude surveys in Norway that the proportion of people with negative attitudes continues to increase to its maximum with the arrival of large carnivores, and then decreases with experience of

living with large carnivores over time. Similarly, they found that the proportion of people afraid of large carnivores was relatively high before carnivore arrival but also decreased with experience. It appears that people can learn to coexist with large carnivores and change their views.

Few human dimension research studies have been completed in Croatia. The first attempts to investigate public opinion about wolves in Croatia (Gyorgy, 1984; Morić and Huber, 1989; Huber et al., 1992; Radišić et al., 1994) came as a response to a shrinking wolf population. These studies suffered from small sample sizes and non-random sampling. This being said, the results from those few studies implied that there had been a change in public attitudes during the 1980s. The overall percentage of Croatians considering the wolf a harmful species dropped from 42% in 1983 (Gyorgy, 1984) to 25% in 1993 (Radišić et al., 1994). In addition, 21% of respondents in 1983 wanted to exterminate wolves (Gyorgy, 1984), while only 8% of the respondents expressed the same view in 1993 (Radišić et al., 1994). As the number of wolves decreased (Frković and Huber, 1992) over time, the attitude toward the species seemed to become more positive (Radišić et al., 1994). This would support the traditional view of natural resources where as a resource becomes scarce, it gains value. It was in the early 1990s, a campaign to completely protect the wolf began in Croatia, and full protection nationwide was declared for the wolf in 1995 (Parliament of the Republic of Croatia, 1995).

With a decrease in rural population and an increase in abandoned agricultural land, wolf numbers began to increase throughout the country and return to areas in Dalmatia, where they were

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exterminated after the Second World War (Frković and Huber, 1992). An increase in illegal killings was also documented during this period (Štrbenac et al., 2005) suggesting attitudes were perhaps shifting once again back to the previous negative viewpoints. A content analysis of newspaper articles seemed to support this hypothesis (Bath and Majić, 2000). As part of this study that examined newspaper articles, data was also collected in 1999 from a representative sample of residents in three regions (Gorski Kotar, Lika and Dalmatia) within wolf range in Croatia. We found that attitudes toward wolves were positive in the northern region of Gorski Kotar, largely neutral in the central region of Lika, and mainly negative in the southern region of Dalmatia (Bath and Majić, 2000). An opportunity to reassess attitudes four years later, in 2003, provided the basis for this paper and the chance to assess whether attitudes have changed. Understanding the strength and direction of attitude change toward wolves in Croatia will allow the Croatian government to more effectively implement their adaptive management approach to wolf management in the country.

By controlling for the two important socio-demographic variables of age and gender, we identify and describe the potential change in attitudes toward wolves among the general public in the wolf-inhabited regions of Croatia. We identify whether the change in attitude is due to a real change or simply a reflection of change in the structure of the population.

2. Methods

2.1. Study area, sampling and data collection

The target populations for both studies were residents of Gorski Kotar (45°20'N, 14°53'E), Lika (44°40'N, 15°23'E) and Dalmatia (43°54'N, 16°09'E). The general public within the Croatian wolf range was divided into three regions (Fig. 1) defined as management units in the Wolf Management Plan for Croatia (Štrbenac et al., 2005) and labelled Gorski Kotar, Lika and Dalmatia. In both measurements we used stratified random sampling (Kalton, 1983) at a community level in order to get the samples representative of each of the three regions. The sampling was based on the most recent national census data, which were 1991 census for the

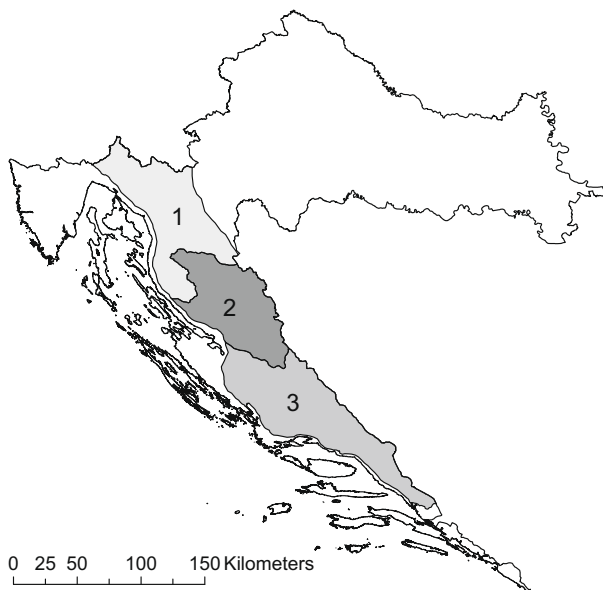


Fig. 1. Study area in both studies was divided into three regions which respond to the national management units (1 = Gorski Kotar, 2 = Lika, 3 = Dalmatia).

1999 study (Central Bureau of Statistics, 1992) and 2001 census for the 2003 study (Central Bureau of Statistics, 2001). Sampled population included all residents of the three regions older than 14 years. While typically respondents over 18 are selected for such social science research, in Croatia the census divided people into the age category 15–20 so sampling was done to be consistent with the census age class. The target sample was 400 per region ensuring a 95% confidence level and a 5% confidence interval (Sheskin, 1985). We carried out all the interviews in person at the respondent's place of residence. A team of five different interviewers conducted the interviews during each data collection period. All of them received interviewer training prior to implementing the interviews.

2.2. Research instrument

The questionnaire used in 1999 was designed by Bath and Majić (2000). It included items covering general attitudes toward wolves, attitudes toward different management options, knowledge and beliefs about wolves, experiences with wolves and demographic information about the respondents. The second questionnaire (Majić, 2007) was a modified version of the earlier one. All attitudinal and belief items included in the analysis were based on a 5-point Likert scale (Likert, 1932) ranging from strongly disagree to strongly agree.

2.3. Data analysis

We used screening of the data in order to check the accuracy. We followed the guidelines given by Tabachnick and Fidell (2001), and checked whether all values were in range and mean scores and standard deviations were reasonable. We used Mahalanobis distances in order to identify outlier cases with unusual patterns of responses and excluded them from the analysis. We also excluded cases with missing data (e.g. no age of the respondent).

We used principal components analysis (PCA) with a varimax rotation as an exploratory technique for identifying the types of attitudes measured by the questionnaire. Following several repetitions with adjusting the number of factors extracted (Tabachnick and Fidell, 2001), regression factor scores were saved as variables and used in the following analysis. To identify whether there was a change in attitudes a between the two measurements we calculated effect sizes and ran t test. To understand the differences in both samples, we calculated the effect sizes and ran MW-U test or Chi-square test, as appropriate.

Age was the most important socio-demographic variable predicting pro-wolf attitudes in the previous analysis of the data from 2003 (Majić, 2007). In order to control for age we partitioned the data into five birth cohort categories, following the guidelines given by Glenn (1977) and labelled them 1 (the youngest one) to 5 (the oldest one). The same study revealed that gender was the most important socio-demographic variable predicting fear of wolves, hence when running t test, data from both measurements (1999 and 2003) were weighted by gender. The data on gender were taken from the national census data from 2001 (Central Bureau of Statistics, 2001), as it was the census which was the closest in time to both data collection periods. Gender was weighted using simulated replication to correspond to the gender ratio from the census.

3. Results

3.1. Respondent characteristics

We obtained sample sizes of 402, 401 and 406 in 1999 and 406, 384 and 382 in 2003, for Gorski Kotar, Lika and Dalmatia, respec-

tively. Response rates were above 80% in all six samples. There were more males (58.2%) than females among the survey respondents, and this proportion remained approximately the same in both measurements (58.5% in 1999, 58.1% in 2003). Median age of the respondents was 52 (range 15–93, IQR 29) years in 1999, and 44 (range 15–93, IQR 29) years in 2003. There seemed to be a real difference in age between the two measurements (8 years difference in median age, MW–U, $p < 0.001$). Most of the respondents reported seeing a wolf in captivity (Table 1), however a larger proportion saw wolves in 2003 (difference = 5.9%, $\chi^2 = 10.58$, $p = 0.001$). On the other hand, less people reported seeing a wolf in the wild in 2003 (difference = 5.7%, $\chi^2 = 6.56$, $p = 0.01$). We could confirm no differences between the two samples in number of respondents reporting they had killed a wolf (difference = 0.5%) or whether they own sheep and/or goats (difference = 0.8%) and are hunters (difference = 1.5%). Eleven cases were identified as multivariate outliers and excluded from further analysis.

3.2. Preparatory analysis

Principal components analysis of the attitudinal items pooled from both surveys resulted in the extraction of three factors (Table 2). The first factor explained 23.8% of the variance and was interpreted as “support to wolf conservation”. Factor 2 explained 23.4% of the variance and was interpreted as “support to control wolf numbers”. The third factor explained 11% of the variance and was interpreted as “fear”. The two items of this factor were fear of hiking in the woods and fear of attacks by wolves on humans. This factor was not used in further analysis as it was based on only these two items and had an eigenvalue that was 1.02.

3.3. Change in attitudes or a cohort effect?

We present the differences in the two factors (support to wolf conservation and support to control numbers) between the two measurements for each of the zones in Table 3. There was a small difference on Factor 1 (support to wolf conservation) in Lika, where the respondents in 2003 scored somewhat lower than those in 1999 indicating decrease in public support for wolf conservation. On Factor 2 (support for wolf control), measured differences in all three regions indicated a decrease in support to control wolf numbers.

The next step was to conduct a cohort analysis of the extracted factors with the purpose of controlling for age. On the “support to wolf conservation” factor (Table 4), changes were recorded in the southern regions, Lika and Dalmatia, however not across all cohorts. In Lika and Dalmatia there was a decrease in support to wolf

Table 1

Characteristics of the respondents with regards to the respondents' experiences with wolves and association with an interest group (GK = Gorski Kotar, LK = Lika, DA = Dalmatia).

Measurement	Region	1999			2003		
		GK	LK	DA	GK	LK	DA
Seen wolf in captivity	N	279	233	246	253	295	296
	%	79.3	76.1	74.3	85.5	80.6	82.2
Seen wolf in wild	N	234	196	192	174	217	194
	%	66.5	63.6	58	58.6	59	53.9
Killed a wolf	N	14	11	3	8	16	10
	%	4	3.6	0.9	2.7	4.3	2.8
Hunter	N	46	25	34	26	27	39
	%	13.1	8.1	10.3	8.8	7.5	10.9
Owns sheep/goats	N	48	80	103	53	83	95
	%	13.6	26	31.1	17.8	22.6	26.4

Table 2

Results of the principal components analysis (PCA): Two factors were extracted and used in further analyses: Factor 1 – support to wolf conservation and Factor 2: support to control wolf numbers. Factor 3 (fear of wolves) was not used in the further analyses. Only loadings >0.30 are shown in the table.

Factor	1	2	3
Rotation sums of squared loadings – % of variance	23.8	23.4	11.4
Eigenvalues	6.66	1.7	1.02
<i>Attitudinal items</i>			
We should assure abundant populations of wolves for the future generations	0.4	–0.6	
Whether I had a chance to see a wolf or not, it is important to me that wolves exist in Croatia	0.73	–0.39	
There is no need to have wolves in Gorski Kotar/Lika/Dalmatia since they already exist in other parts of Croatia	–	0.72	
Wolves should be completely protected in Gorski Kotar/Lika/Dalmatia	0.41	–0.72	
Wolves should be allowed to be hunted year round	–0.7	0.38	
Wolves should be allowed to be killed with all possible means, including poisons and killing pups in dens	–	0.65	
Wolves keep roe deer populations in balance	0.59		
In areas where wolves live close to the communities, attacks on humans are common	–		0.71
I would be afraid to walk in woods where wolves are present	0.31		0.8
I would agree with increasing wolf numbers in Croatia	0.46	–0.63	
It is important to maintain wolf population in Croatia for future generations	0.79		
Wolves should be allowed to be hunted in a specific hunting season in Gorski Kotar/Lika/Dalmatia		0.68	
Wolves cause a lot of damage to livestock.		0.58	0.43
If a wolf killed livestock, I would agree with killing of that problem animal		0.69	
We already have enough wolves in Croatia		0.68	
Farmers should receive compensations for the damages that wolves cause on their livestock		0.54	

conservation. Consistently across all regions, only in the oldest cohort (number 5) there were no changes on Factor 1.

On the “support to wolf control” factor (Table 4) we also found changes in the two southern regions and across all cohorts, except the youngest one. These results indicated a decrease in support to control of wolf numbers.

Plots of mean values across the cohorts, regions and the two measurements (Fig. 2) illustrate the effect of cohorts on attitudes toward wolves. Support to control of wolf numbers increases with age, while support to wolf conservation decreases. Visual examination of the plots allows for comparisons among the regions across the cohorts. By looking at the intersection points of the attitudinal factors' plots across the cohorts, it is possible to single out the cohort in which the presumed shift in attitudes toward wolves from negative to more positive occurred in each of the three regions. Our results suggest that this shift first took place in Gorski Kotar as the intersection point lies over the cohort group 4, followed by Lika (cohort 2 in 1999 and 3 in 2003) and lastly Dalmatia (cohort 1 in 1999 and 2 in 2003). Notable are also the extreme differences across the cohorts in Lika and Dalmatia in 1999, where the younger cohorts were strongly supporting wolf conservation and opposing wolf control, while the older cohorts expressed the almost exact opposite extreme opinions.

4. Discussion

Many researchers have found that socio-demographic characteristics of respondents influence the attitudes toward wolves. Elderly, less educated people, women and sheep farmers tended to have more negative attitudes toward wolves (e.g. Kellert, 1985; Bath and Buchanan, 1989; Bjerke et al., 2000; Ericsson and Heber-

Table 3
Comparisons of sample sizes (*N*), mean scores (possible range –1 to 1) and standard deviations (SD) for the two measurements across the three regions. We evaluated attitude change by calculating actual difference in mean scores (diff), pooled standard deviations (SDp) and by running *t* test. When running *t* test the data were weighted by gender.

Region	1999			2003			Difference 1999–2003	
	N	Mean	SD	N	Mean	SD	diff	SDp
<i>Factor 1</i>								
G. Kotar	352	0.09	0.86	295	0.18	0.90	–0.09	0.88
Lika	308	0.31	1.22	368	–0.03	0.90	0.34	1.06a
Dalmatia	331	–0.19	1.14	360	–0.32	0.90	0.13	1.02
<i>Factor 2</i>								
G. Kotar	352	–0.18	0.90	295	–0.51	0.85	0.33	0.88a
Lika	308	0.48	1.20	368	–0.25	0.84	0.73	1.02a
Dalmatia	331	0.64	0.94	360	–0.25	0.73	0.89	0.84a

a = $p < 0.001$.

Table 4
Comparisons of sample sizes (*N*), mean scores (possible range –1 to 1) and standard deviations (SD) for the two measurements across the three regions and across birth cohorts (1 representing the youngest birth cohort and 5 representing the oldest birth cohort). We evaluated attitude change by calculating actual difference in mean scores (diff), pooled standard deviations (SDp) and by running *t* test. When running *t* test the data were weighted by gender.

Cohort	1999			2003			Change 1999–2003	
	N	Mean	SD	N	Mean	SD	diff	SDp
<i>Gorski Kotar, Factor 1</i>								
1	56	0.24	0.82	96	0.21	0.63	0.03	0.70
2	62	0.11	0.77	53	0.37	0.80	–0.26	0.78
3	65	0.10	0.71	59	0.18	0.97	–0.08	0.84
4	88	0.10	0.90	35	–0.04	1.07	0.14	0.94
5	81	–0.11	1.06	25	–0.36	0.90	0.25	1.02
<i>Gorski Kotar, Factor 2</i>								
1	56	–0.60	1.02	96	–0.79	0.80	0.19	0.88
2	62	–0.35	0.88	53	–0.49	0.87	0.14	0.87
3	65	–0.19	0.89	59	–0.33	0.81	0.14	0.85
4	88	–0.01	0.75	35	–0.03	0.79	0.02	0.76
5	81	0.06	0.86	25	0.01	0.68	0.05	0.81
<i>Lika, Factor 1</i>								
1	48	0.61	0.96	71	0.03	0.77	0.58	0.84a
2	58	0.92	1.12	96	0.17	0.80	0.75	0.93a
3	59	0.42	1.04	64	0.20	0.75	0.22	0.89
4	58	0.29	1.31	62	–0.25	0.89	0.54	1.10b
5	80	–0.35	1.22	58	–0.52	0.96	0.17	1.11
<i>Lika, Factor 2</i>								
1	48	–0.65	1.41	71	–0.47	0.88	–0.18	1.11
2	58	0.47	1.21	96	–0.28	0.81	0.75	0.97a
3	59	0.54	1.08	64	–0.25	0.84	0.79	0.95a
4	58	0.86	1.01	62	–0.09	0.70	0.95	0.86a
5	80	0.93	0.91	58	0.04	0.81	0.89	0.86a
<i>Dalmatia, Factor 1</i>								
1	36	0.63	1.06	52	0.28	0.82	0.35	0.91
2	59	0.23	1.07	103	–0.21	0.84	0.44	0.92b
3	70	–0.02	1.01	74	–0.41	0.92	0.39	0.96c
4	70	–0.60	1.01	60	–0.74	0.87	0.14	0.94
5	90	–0.62	1.14	56	–0.20	0.85	–0.42	1.03
<i>Dalmatia, Factor 2</i>								
1	36	–0.11	1.17	52	–0.49	0.86	0.38	0.99
2	59	0.55	1.15	103	–0.21	0.65	0.76	0.86a
3	70	0.71	0.93	74	–0.15	0.81	0.86	0.86a
4	70	0.79	0.73	60	–0.10	0.56	0.89	0.65a
5	90	0.84	0.67	56	–0.20	0.66	1.04	0.66a

a = $p < 0.001$, b = $p < 0.010$, c = $p < 0.050$.

lein, 2003; Kleiven et al., 2004). Knowing this, and having in mind that the sampled populations are open systems with people immigrating, emigrating, dying and entering our sampling frame as they get older, means that any potentially detected attitude change could merely be a reflection of the change in the structure of the sampled population and not an actual attitude change. Under-

standing this difference is important for understanding the nature of the attitudes and their formation.

It is difficult to document a real change in attitudes over time because we tend to sample populations at different points in time rather than directly tracking individuals over time. By understanding the most important socio-demographic characteristics influencing the attitudes toward wolves and controlling for them, we can distinguish among attitude change due to change in population structure and real attitude change. We believe that we have documented a real change in attitudes toward wolves in Croatia, as the observed changes were independent of the most important socio-demographic parameters, age and gender.

According to Eagly and Chaiken (1993), the people that already have favourable or unfavourable thoughts predominating their attitudes about an issue will be more susceptible to cognitive structure change and thus to attitude change (i.e. those with negative attitudes will reinforce their negative attitudes). Their attitudes will be relatively enduring, resistant and predictive of that person's behaviour. Those that hold neutral attitudes might experience peripheral attitude shift when exposed to new information, and form attitudes which are relatively temporary, susceptible, and not predictive of behaviour. According to this we would expect that the residents of the Lika region, which have predominantly neutral attitudes towards wolves, might be influenced only temporarily by persuasive messages. On the other hand the Dalmatians, with predominantly negative attitudes, and the people from Gorski Kotar, with predominantly positive attitudes, should be more susceptible to change.

However, in the period between the two studies (1999–2003) the Croatian government implemented a program aimed at mitigating the effects of the damages caused by wolves on livestock. All of the activities, such as donations of electric fences and livestock guarding dogs, as well as lectures and seminars, were carried out in Lika and Dalmatia (Štrbenac et al., 2005). From that perspective, we would expect an attitude change among the respondents coming from those two regions.

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 clearly indicate that considerable changes in attitudes toward wolves can occur, even over a relatively short period of time. The changes were documented in the two southern regions, Lika and Dalmatia, with attitudes drifting towards a more neutral position, as there was both a decrease in support to wolf conservation and a decrease in support to control wolf numbers. Furthermore, the differences in attitudes among the cohort groups in Lika and Dalmatia became smaller. The hypothesis that Lika, as a neutral region, should be the most susceptible for changes in attitudes was rejected as soon as we partitioned the data into the cohort categories.

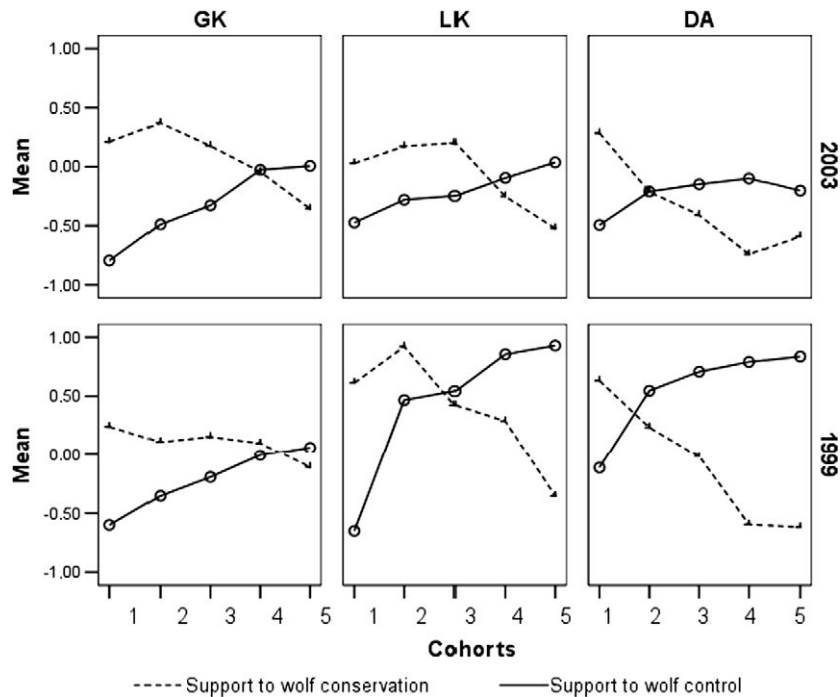


Fig. 2. Mean values of the two analysed factors (support to wolf conservation and support to wolf number control) across the regions (Gorski Kotar = GK, Lika = LK and Dalmatia = DA), the two measurements (1999 and 2003) and birth cohorts (1 representing the youngest birth cohort and 5 representing the oldest birth cohort).

Examining the cohort data for Lika in 1999 revealed that that “neutral” group was actually composed of “extreme” cohorts with the younger cohorts supporting wolf conservation and opposing wolf control more than the most positive group, the Gorski Kotar respondents. On the other hand, the older cohorts were strongly opposing conservation of wolves and strongly supporting control of the wolf population. A similar pattern across the cohorts was also found in Dalmatia, the most negative toward wolves among the three regions. In 1999, the younger cohorts may have been influenced more by the legal protection campaign than the older cohorts. At this time, the older cohorts seemed more sympathetic to livestock protection concerns and as a result held stronger negative attitudes toward wolves. Attitudes in Gorski Kotar seem to have remained stable across the two measurements. One explanation for this could be the absence of sheep farming in this region and consequent absence of wolf-livestock conflicts, resulting in less public interest in wolf management.

From the analytical perspective the change in attitudes in Lika and Dalmatia can be seen as supportive of our hypothesis that the government’s mitigating measures for conflicts caused by predator damage to livestock in these two regions would also reflect on the attitudes toward wolves, as there was a decrease in support to control wolves. However, the support for wolf conservation has also decreased considerably in these two regions, indicating that there was a decrease in overall public interest for wolf management. We can interpret this as fading of the anger-driven negative attitudes that were caused by the initial legal protection of wolves (Bath and Majić, 2000). We suggest that over time, living with wolves within this new framework of protection could lead towards more tolerance and better coexistence.

The movement from extreme viewpoints toward more neutral attitudes creates greater possibilities for compromise between all groups, and suggests that extremely positive attitudes toward wolves can be just as “problematic” as extremely negative ones in working towards effective solutions in wolf management. Traditionally, we 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. In fact, finding neutral attitudes has been seen as an opportunity to influence those views toward more positive viewpoints. The results of our 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. We do need attitudinal studies to understand the nature of conflicts, but instead of focusing on changing the attitudes afterwards, we would do better to focus on a resolution of the underlying conflict. We believe that the effects the implemented management decisions have on public attitudes should be addressed more often in human dimensions research. Such research could help evaluate the effectiveness of a specific educational program or policy change, or even provide an understanding of the effect that a change in the status of a certain wildlife population might have on the attitudes. Through such attitudinal and belief monitoring the human dimensions as a research field could evolve from isolated studies driven by key management issues into an integrated component of any wildlife management decision-making process.

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