

Public attitudes towards brown bears (*Ursus arctos*) in Slovenia

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Abstract

In northern Slovenia a radical change in brown bear (*Ursus arctos*) management – from a policy of bear suppression to a policy of bear protection – resulted in a sharp increase in sheep predation by bears. In the bear core area in southern Slovenia, on the other hand, bears have always been present, cause little damage and are an important game species. This zoned management provided a quasi “natural experiment” to compare attitudes and knowledge between two areas of different bear history, management and damage level. Using a questionnaire survey we sampled 924 locals and 177 hunters in the two areas. Contrary to our expectation, we documented a very positive attitude towards bears, in both study areas and for both target groups. Apparently, regional differences in the damage level per se and the status as a game species are not the driving force shaping attitudes towards bears in Slovenia. The key factor in predicting the attitude towards bears was the perception of how harmful the bears are. Knowledge and socio-demographic factors were only of minor importance. Even though attitude towards bears was positive, support of the present policy of bear expansion was low.

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1. Introduction

In most areas where humans coexist with large carnivores, conflicts exist (Sillero-Zubiri and Laurenson, 2001). In Europe these conflicts largely mean livestock predation (Linnell et al., 1996; Kaczensky, 1999), competition for wild ungulates (Dahle, 1996) or in more rare cases attacks on people (Swenson et al., 1999). In the past direct persecution in combination with habitat destruction led to the near extinction of brown bears (*Ursus arctos*), wolves (*Canis lupus*) and lynx (*Lynx lynx*) in western, southwestern and central Europe (Breitenmoser, 1998; Kaczensky, 1999). Dwindling populations of large carnivores on the one hand, and a high degree of

urbanization on the other hand, led to a change in attitude towards large carnivores. Today, nature conservation and wildlife protection have become important public issues (Schröder, 1998) and international treaties (e.g. Council of Europe, 1979; Council of the European Union, 1992) even demand the restoration of large carnivores to suitable areas.

Large carnivores are returning to or increasing in many regions of Europe, due to natural re-colonization and re-introduction projects (Boitani, 2000; Breitenmoser et al., 2000; Swenson et al., 2000). Public attitudes are generally believed to be most positive in areas where carnivores are absent (Kellert et al., 1996; Zimmermann et al., 2001) or in areas with an unbroken carnivore-human coexistence (Bath and Majic, 2001; Boitani, 1995). But while attitudes might be favorable in a large portion of today's urban population, locally the old conflicts still exist, with many farmers and hunters strongly opposed to carnivore recovery. They are the groups most directly affected, and they are afraid of

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damage to livestock and game, increased costs and working efforts, foreign involvement and new restrictions (Egli, 1998; Hunziker et al., 1998; Kvaalen, 1998; Ueberschär, 2000; Kaczensky, 2003). In the absence of large carnivores, locals have often abandoned traditional herding methods and may have lost the knowledge about the predators themselves. The re-appearance of large carnivores, therefore, may result in locally high damage levels (Kaczensky, 1999) and/or a high level of fear among local residents (Szinovatz, 1997; Zimmermann et al., 2001). In addition, with the perceived social pressure to act in a certain way, this may result in a highly negative attitude across a whole region. Even though the actual financial losses might be small, the recovery of large carnivores is seen as a threat to the traditional lifestyle and often highlight a gap between urban and rural people in modern society (Breitenmoser, 1998; Kvaalen, 1998).

In several eastern European countries the situation was somewhat different for the bear. In countries like Slovenia, Slovakia, Bulgaria or Romania the bear was, and still is, seen as a valuable game species and it was largely hunters' interest that resulted in stable or increasing bear populations, despite bear-human conflicts (Kaczensky, 1999; Simonic, 1994). With the fall of the iron curtain and the subsequent democratization and re-privatization, the hunting lobby has lost political power and bear managers have to acknowledge, that in the multi-use landscapes of Europe, the future of large carnivores will depend on a policy accepted by all local people, and not foremost to suit one interest group alone.

People that hold a strong positive attitude towards bears will most likely: (1) support actions favourable to bears, (2) tolerate bear damage, and (3) maintain their position in case of conflict (Ajzen, 1993; Bright and Manfredo, 1995). Usually one expects more positive attitudes with increasing knowledge (Bath and Buchanan, 1989). But especially in the case of a highly controversial large carnivore species, a negative relationship between knowledge level and acceptance can be found (Bath, 1994; Bright and Manfredo, 1995; Kellert et al., 1996; Szinovatz, 1997). Threatened species status and declining population trend generally result in a more positive attitude towards large carnivores, as do financial or emotional incentives (Kellert et al., 1996). Alternatively, the actual or perceived threat a large carnivore poses to human life and property has a strong negative influence on attitudes towards large carnivores (Egli, 1998; Korenjak, 1995; Kellert et al., 1996; Kvaalen, 1998; Prosen, 2001). Generally, older people, females, people with a lower education level, people working in natural resource dependent professions, people living in a rural environment and people living in the carnivore distribution range tend to be more negative than their respective counterparts (Hook and

Robinson, 1982; Bath, 1991; Kellert, 1994; Kellert et al., 1996).

The Alps in Central Europe, although heavily frequented by people, still provide large stretches of suitable habitat for brown bears (Corsi et al., 1998; Knauer, 2000). Presently the bear population in Slovenia is the only source for natural re-colonization of the Alps and provides the only link between the large bear population of the Dinara Mountain range and the small and fragmented bear occurrence in the Alps (Adamic, 1997; Adamic, 2003). In Slovenia bear management is zoned. In southern Slovenia bears have always been present, the damage level is low and the bear is an important game species. Outside the core area, bears have been suppressed until 1992, when increasing international interest for the natural re-colonization of the Alps led to the protection of bears in the outer area (Simonic, 1994). Bears are consequently reappearing in the subalpine and alpine regions, where in the absence of large predators, extensive sheep farming has become widespread, supported by a subsidy system to adjust Slovenian agriculture to European Union common agricultural policy (CAP, Savelli et al., 1998). The reappearance of bears has resulted in increasing predation and triggered intense and controversial discussions among the various interest groups and bear managers, challenging the present expansion policy (Adamic, 1996; Adamic, 1997; Kaczensky, 2000a; Kaczensky, 2000b; Krystufek et al., 2003).

The radical change of the bear management in northern Slovenia in 1992, from a policy of bear suppression to a policy of bear protection, was not accompanied by a public relations program, nor were local people involved in the decision making process. This situation provided a quasi "natural experiment" to compare attitudes and knowledge in two areas of different bear history, management and damage level. Using a questionnaire we sampled two target groups, the general public and hunters to test the following assumptions:

- (1) The high damage level that accompanies the return of the bear, will result in locals in the outer area being more negative towards bears, less supportive of the present policy of bear expansion, and more likely to consider bears as harmful than people in the core area.
- (2) Because of the long absence of bears, people in the outer area will know less about bears, than people in the core area.
- (3) Because the bear is a game species, hunters will have a greater knowledge, will consider the bear more useful, and will have a more positive attitude towards bears and the present policy of bear expansion, than the local population.
- (4) Attitude towards bears is a key variable to predict support of the present policy of bear expansion.

The aim of the study was therefore to provide baseline data on peoples' attitude towards bears, identify key factors influencing attitude and knowledge gaps, and assess peoples' support of the present bear management in Slovenia. The results should help to: (1) encourage and facilitate communication between bear managers, hunters and locals – the first step to initiate public involvement in wildlife management and (2) develop public information that focus on the concerns, misbeliefs and key issues of the various interest groups.

2. Method

2.1. Study area

We chose one study area in both the low conflict area in the south (core area) and in the high conflict area in the north (outer area) for comparison (Fig. 1). The core area covers about 5200 km² and more than 80% of the estimated total population of 300–500 bears live there. About 40 bears are harvested annually using a quota system during a limited hunting season. In 1998 at least 20,000 sheep, or 30% of the total sheep flock were present in the core area. Most sheep are kept in pens in the municipality where they are registered. From 1995 to 1998 annual bear predation in the core area increased from 21 to 132 sheep (Slovenian Ministry of Agriculture, unpubl. data). In 1998 each bear killed an average of 0.4 sheep and total annual bear damage was about 0.7% of the total sheep flock in the core area.

The outer area covers ca. 14,500 km² and bears could be killed without limit year-round until 1991

(Simoncic, 1994). To allow for increased dispersal of bears into the Alps, this management was changed and now bears in the outer area are fully protected. However, special permission to shoot problem individuals may be granted by the Ministry of Agriculture. About 47,000 sheep are present in the outer area and from 1995 to 1998 predation increased from 113 to 559 sheep/year (Slovenian Ministry of Agriculture, unpubl. data). In 1998 each bear killed on average 7 sheep and the total annual bear damage was about 1.2% of the total sheep flock in the outer area. We selected our study areas in the core- and outer area so that the human population parameters were similar (Statistical Office of Slovenia, unpubl. data; Table 1), but the damage situation was different (Fig. 1).

2.2. Survey methods

The target groups studied were (1) the general public ≥ 16 -years-old and (2) hunters of the local hunting clubs. We were concerned about low return rates because people in Slovenia are flooded with questionnaire surveys through the regular post. Accordingly, we distributed the questionnaires personally with the help of biology students from the University of Ljubljana. We distributed 100 questionnaires to hunters, and 500 to locals in each of the two study areas. For locals we distributed half in villages with up to 700 inhabitants (rural) and half in towns with more than 700 inhabitants (urban). The number of questionnaires distributed in each town or village was proportional to the number of inhabitants. We chose people by selecting houses randomly on the map and handing the questionnaire to the

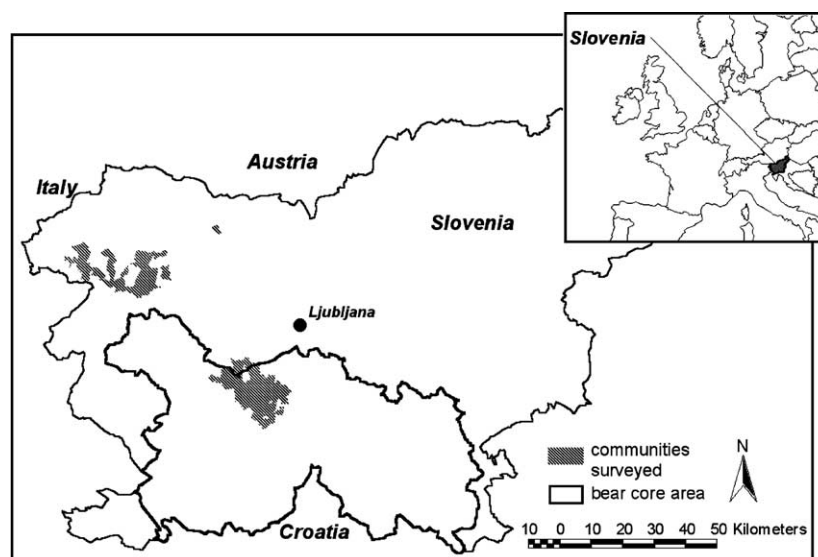


Fig. 1. Location of the communities surveyed for their attitude towards and knowledge about bears in 1998. The study area in central Slovenia is located in the bear core area where bears have always been present, are a game species and cause little damage, whereas in the north-western study area bears are rare, fully protected and cause more damage.

Table 1

Parameters of the local population living in both study areas as compared to the local population sampled with questionnaires

Population parameters	Core area			Outer area		
	Area	Sample	Statistical data	Area	Sample	Statistical data
Total population	24,121			18,410		
Total population ≥ 16 years	18,301	455	2.5% sampled	13,435	469	3.5% sampled
Urban population (in towns with >700 inhabitants) (%)	85	50		76	50	
Age structure (%)			χ^2 residuals			χ^2 residuals
16–19 years	8	5	–10.6	6	5	–11.1
20–29 years	21	18	–11.5	14	23.9	
30–39 years	22	22	0.9	16	19	–12.6
40–49 years	16	21	25.2	13	20	17.6
50–59 years	15	16	3.9	12	15	5.8
60–69 years	10	11	5.4	10	12	–0.4
>70 years	8	5	–13.3	8	5	–23.6
χ^2 sign			0.003		≤ 0.001	
Missing cases		27			14	
Sex ratio (%)			χ^2 residuals			χ^2 residuals
Females	52	46	–28.3	52	45	–32.7
Males	48	54	28.3	48	55	32.7
χ^2 sign			0.007			0.002
Missing cases		16			4	
Profession (%)			χ^2 residuals			χ^2 residuals
Farmer + forester	6	7	5.0	7	4	–13.4
Other	94	93	–5.0	93	96	13.4
χ^2 sign			0.325			0.015
Missing cases		14			14	
Working–nonworking (%)						
Working	–	63		–	65	
Student	–	11		–	11	
Pupil	–	1		–	1	
Housewife	–	5		–	5	
Retired	–	20		–	18	
Education (%)			χ^2 residuals			χ^2 residuals
Primary school	45	16	–128.7	43	16	–123.7
Secondary school	45	67	91.9	44	58	61.4
University	4	14	45.4	5	21	73.2
Other	5	3	–8.6	6	5	–11.0
χ^2 sign			≤ 0.001			≤ 0.001
Missing cases		14			12	
Illiterates (%)	0.2	–		0.3	–	

person who opened the door or was seen in front of the house. If people were not at home or refused to accept the questionnaire, we approached the next neighboring house in the same way. We left the questionnaire with the person and collected it a few hours later. To test for a possible nonresponse bias, we noted sex and estimated age of people who refused to participate. Hunters were sampled by contacting the presidents of 6 hunting clubs randomly selected in each of the 2 study areas. We either distributed the questionnaires personally during hunters' meetings or gave them to the president for distribution.

2.3. Questionnaire design

The questionnaire from Bath (1991) was revised and adapted to the Slovenian situation, and translated into the Slovenian language. To identify potential problematic questions or confusion with instructions we discussed the questionnaire with a group of students and then qualitatively pre-tested it with 10 locals. The final questionnaire comprised 71 questions organized in 6 sections and was printed as a small booklet with a colored cover. All attitudinal questions were measured on a 5-point Likert scale ranging from "strongly agree" to

“strongly disagree”. “Do not know” options were not included to encourage people to give a statement. Most questions about knowledge were stated as multiple-choice questions, also offering a “do not know” option.

2.4. Return rate and representativity of the sample

The sampling scheme proved to be very efficient. Cost averaged about 3.2 US\$ per successful questionnaire and return rate was 98.5% for locals and 88% for hunters. Acceptance rate for locals (% that agreed to participate in the survey when first approached) was also high and averaged 75%. For analysis we discharged all questionnaires with obvious nonsense answers, and those filled in by respondents <16-years-old. Thus of the

1173 questionnaires collected, we used 1101 (95%) for final analysis. Our sample comprised 2.5% and 3.5% of the local population, and 24% and 27% of the hunters in the core- and outer study area, respectively.

The socio-demographic profile of our local respondents was largely representative of the total population of the region, except that people with only a primary school education were strongly underrepresented in our sample (Table 1). However, our regression models did not identify education as an important factor predicting attitude-, number-, utility- and knowledge score (Table 4). Nonrespondents were strongly biased towards females ($p < 0.005$, χ^2 residuals: -50.0) and slightly biased towards people between 16 and 39 years ($p < 0.005$, all χ^2 residuals $< \pm 33.0$). The hunter sample was comprised

Table 2
Questions used to calculate mean score values

Score	Cronbach's α -values	<i>n</i>
<i>Attitude towards bears – attitude score:</i>	0.92	981
1. Which answer best describes your feelings towards brown bears?		
2. Is having bears in Slovenia (SLO) good – bad – neither good nor bad?		
3. It is important to maintain bears in SLO so our children can enjoy them		
4. It is important to have “viable” populations of bears in SLO		
5. Whether or not I would get to see a bear, it is important for me that they exist in SLO		
6. Bears are a sign of an intact nature		
7. Because many bears live in other parts of Europe, there is no need to have bears in SLO ^a		
<i>Attitude towards a further increase in the bear population – number score:</i>	0.74	1024
1. Bear numbers in SLO should be high enough, so bears can move to Italy and Austria		
2. Bears should not be hunted at all in SLO		
3. If bears are hunted, hunting should be restricted to specific areas		
4. Bears should be allowed to be hunted year round in SLO ^a		
5. Bear numbers should be increased		
6. There is already enough bears in SLO ^a		
7. Bears should only live in restricted parts of SLO ^a		
8. Bear should be eliminated in areas with sheep problems ^a		
<i>Perception of usefulness/harmfulness of bears – utility score:</i>	0.78	1017
1. Bears have a negative impact on hunting opportunities ^a		
2. Bears greatly reduce deer numbers ^a		
3. Bears increase the value of a hunting area		
4. Bears kill a lot of sheep in SLO ^a		
5. In areas where bears live close to sheep, their primary food is sheep ^a		
6. Having bears increases tourism to SLO		
7. In areas where bears live close to people, bear attacks on humans are common ^a		
8. I would be afraid to go into the woods if bears are present ^a		
<i>Knowledge level – knowledge score:</i>	0.64	1101
1. How many bears do you think live in SLO?		
2. Do you believe bear numbers in SLO are increasing–decreasing remain the same?		
3. Do you believe bears exist in the area between Vrhnika, Krim and Cerknica?		
4. Do you believe bears exist in the area between Tolmin, Bohinjjsca Bistrica and Kobarid?		
5. Do bears get shot in SLO?		
6. Do bears kill sheep in SLO?		
7. How much space does one adult brown bear need?		
8. Female bears have young every year		
9. Most bears weigh less than 150 kg		
10. Bears mainly feed on meat		
11. Farmers are paid money for sheep killed by bears		
12. Bears can only be hunted in some parts of SLO		

^a Coding reversed.

almost exclusively of males (99%) and had a higher percentage of farmers and foresters compared to the local sample. No socio-demographic data on all hunters in the study areas were available for comparison.

2.5. Data analysis

All data analysis was done with SPSS version 8.0 and 9.0. For statistical tests we used $p < 0.05$ for significance level. To minimize random errors (Zeller and Carmines, 1980), our questions were constructed in a way that enabled us to group similar questions. We calculated 4 mean scores: attitude towards bears (attitude score), the perception how useful/harmful the bears are (utility score), the support for the present policy of bear expansion (number score) and knowledge level (knowledge score) (Table 2). Answers were coded in the way that positive feelings were expressed by high values on the Likert scale and negative feelings by low values. For knowledge questions all answers were coded as dichotomous variables, using 1 for correct answer and 0 for incorrect, do not know and missing answers. Reliability estimates for our scores were high, supporting our grouping of related questions (Zeller and Carmines, 1980; Table 2). Only the knowledge score was at the lower limit ($\alpha = 0.64$; Litwin, 1995) which is most likely the result of the multidimensional nature of the questions and might also derive from frequent guessing of the multiple choice questions. We used ANOVA statistics to compare scores among target groups and study areas and t -tests

to compare scores between study areas and between target groups.

To evaluate which factors influence attitude and whether attitude is a good predictor for support of the present policy of bear expansion we used stepwise multiple regression statistics following a simple causal model (Fig. 2). To assess the influence of each variable separately from the other variables, we additionally calculated Pearson's correlation coefficients for all variables initially included in the model. For socio-demographic variables, however, we calculated correlation coefficients only for those variables that had a significant influence in the final model.

Key questions, and questions concerning the present bear management were tabulated. For ease of interpretation, all questions were regrouped by combining the answers *strongly agree* and *agree* into one category *agree* and *strongly disagree* and *disagree* into one category *disagree*.

3. Results

3.1. Comparison between study areas and target groups

We did not find large differences in the attitude towards bears between respondents of the two study areas, nor between target groups within the study areas (Fig. 3, Table 3). Even though t -tests revealed significant differences in the attitude between locals in the core area and locals in the outer area, the difference was very small.

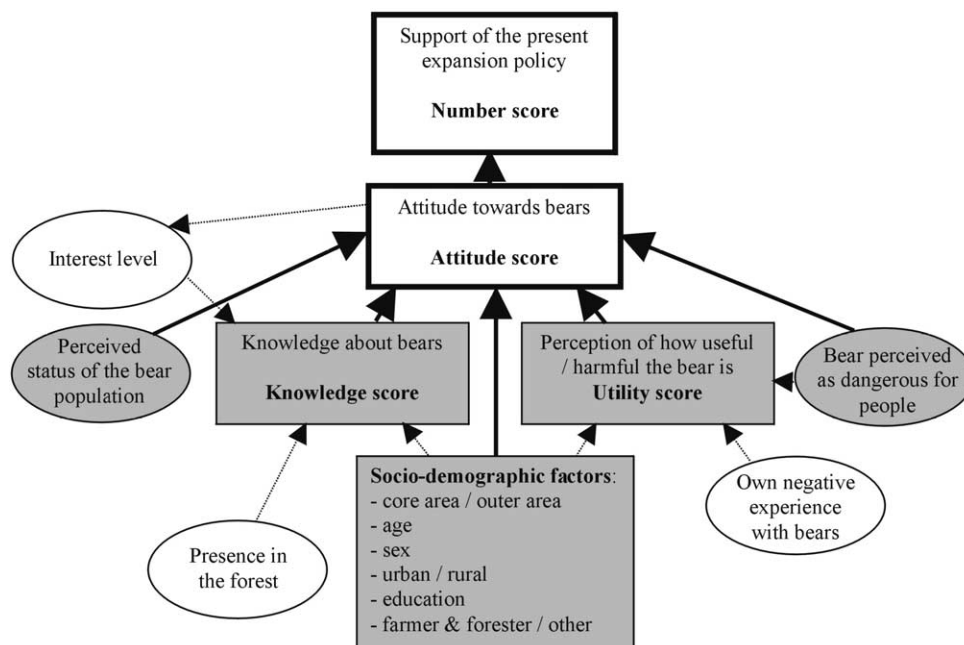


Fig. 2. Causal model used for testing of the relationship of different variables on the attitude towards bears and thus the support for the present bear expansion policy in Slovenia.

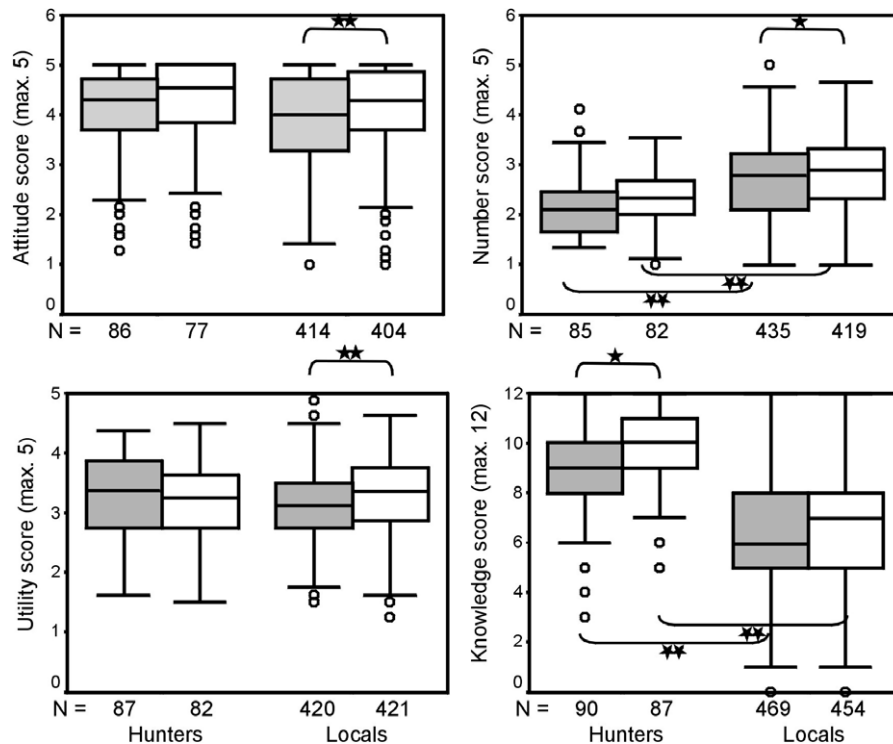


Fig. 3. Distribution of average score values separate by target group and study area. The box indicates the median, 25% and 75% quartiles and whiskers are the largest values that are not outliers, while circles mark outliers. We used ANOVA statistics and *t*-tests (with Bonferoni and Tamhane-T2 corrections depending on equality of variance) to check for differences in mean score values between study areas within target groups and between target group within study areas. * mark significant differences in the mean score value on the $p < 0.05$ level and ** on the $p < 0.001$ level.

Table 3
Mean score values for locals and hunters in the two study areas

Variable		Locals		Hunters	
		Core area	Outer area	Core area	Outer area
Attitude score (1–5)	Mean	4.08	3.83	4.21	4.07
	SD	0.91	1.02	0.99	0.93
Number score (1–5)	Mean	2.84	2.71	2.31	2.21
	SD	0.74	0.80	0.52	0.65
Utility score (1–5)	Mean	3.32	3.13	3.21	3.30
	SD	0.61	0.59	0.65	0.69
Knowledge score (1–12)	Mean	6.81	6.00	9.86	9.07
	SD	2.24	2.19	1.55	1.81

Locals and hunters in both areas had a score close to 4 which on a Likert scale of 1–5 (strongly dislike to strongly like) means that the average respondent liked bears.

Even though attitude was high, support of the present policy of bear expansion was only low to moderate (Fig. 3) and contrary to our expectation hunters were less supportive of the present policy of bear expansion than locals.

Knowledge score was clearly greater for hunters than for locals (Fig. 3). On average, hunters knew the correct answers for 3–4 more questions (25–33%) than locals. Within the target groups locals and hunters in the core area scored somewhat higher than their counterparts in the outer area – the average difference, however, was only 1 question (8%).

The utility score was moderate for all respondents (Fig. 3). Contrary to our expectations, both hunters and locals consider the bear slightly more useful than harmful, regardless of the damage level in the area and regardless of whether or not they are allowed to hunt them. Our findings somewhat support assumption 2, but neither assumption 1 nor 3.

3.2. Variables influencing attitude towards bears and the support of the present policy of bear expansion

Attitude of locals and hunters was best predicted by utility score and whether bears were regarded as dangerous for humans (Table 4). For hunters knowledge score and for locals knowledge score and the perception

Table 4

Stepwise multiple regression models to test the influence of different variables following the basic model in Fig. 2

Independent variable	Correlation coefficient of single variable ^a	
	Locals (<i>n</i> = 924)	Hunters (<i>n</i> = 177)
Dependent variable: number score		
(1) Attitude score	0.63**	0.48**
Total model fit (<i>r</i> ²)	0.40**	0.23**
Dependent variable: attitude score		
(1) Utility score	0.63**	0.66**
(2) Is the bear dangerous for humans? ^b	−0.49**	−0.44**
(3) Education ^c	0.27**	
(4) Perceived status of the bear population ^d	−0.22**	−0.16*
(5) Knowledge score	0.19**	0.38**
(6) Forester or farmer	−0.14**	
(7) Female	−0.06 ns	
Total model fit (<i>r</i> ²)	0.47**	0.48**
Model equation with standardized beta values:		
Locals: attitude		
score = 1.17 + 0.49*(1) − 0.16*(2) − 0.16*(4) + 0.15*(5) − 0.10*(6) + 0.09*(3) − 0.08*(7)		
Hunters: attitude score = 0.58 + 0.55*(1) + 0.18*(5) − 0.12*(2)		
Dependent variable: utility score		
(1) Is the bear dangerous for humans?	−0.54**	−0.50**
(2) Own negative experience ^c	−0.32**	−0.26**
(3) Female	−0.22**	
(4) Urban	0.21**	
(5) Education	0.16**	0.24**
(6) Core area	0.10**	
Total model fit (<i>r</i> ²)	0.41**	0.29**
Model equation with standardized beta values		
Locals: utility score = 3.25 − 0.46*(1) − 0.23*(3) − 0.20*(2) + 0.13*(5) + 0.12*(6) + 0.06*(4)		
Hunters: utility score = 3.08 − 0.48*(1) − 0.19*(5)		
Dependent variable: knowledge score		
(1) How often do you walk in the forest? ^f	0.26**	0.16*
(2) Female	−0.24**	
(3) Core area	0.18**	0.23**
(4) Education	0.14**	0.21**
(5) Interest level in bear issues ^g	0.12**	0.31**
(6) Forester or farmer	0.08*	
(7) Age	0.06 ns	
Total model fit (<i>r</i> ²)	0.15**	0.19**
Model equation with standardized beta values:		
Locals: knowledge		
score = 4.18 + 0.18*(1) + 0.17*(3) − 0.15*(2) + 0.11*(5) + 0.11*(7) + 0.09*(4) + 0.07*(6)		
Hunters: knowledge score = 9.29 + 0.32*(5) + 0.24*(3) + 0.17*(4)		

^a*** Significant on the *p* < 0.01 level, * Significant on the *p* < 0.05 level, ns = not significant.^b Dichotomous variables: 0 = no, 1 = yes.^c Rank variable: 1 = decreasing, 2 = remain the same, 3 = increasing.^d Rank variable: 1 = primary school, 2 = secondary school, 3 = university.^e Mean of the dichotomous variables: "Have you or your family experienced any damage by bears?" and "Did you ever feel threatened by a bear?".^f Rank variable: 1 = never, 2 = few times (1–7 days/years), 3 = often (8–30 days/years), 4 = very often (>30 days/years).^g Rank variable: 1 = not at all, 2 = somewhat, 3 = a great deal.

of the bear population trend also were of some importance. Knowledge score and perceived status of the bear population were only moderately correlated for locals (Pearson correlation coefficient $r = 0.359$, $p < 0.001$) and only slightly correlated for hunters (Pearson corre-

lation coefficient $r = 0.175$, $p = 0.21$). Socio-demographic factors were of minor importance for locals and of no importance for hunters. For locals, attitude tended to be more negative for farmers or foresters, females and people with a lower education level. However these

variables did not add much additional predictive value to overall model fit, as utility score and the perception of whether bears were regarded as dangerous for humans already explained 45% and 42% of the variation in attitude score of locals and hunters, respectively. Thus, neither knowledge level, nor socio-demographic variables seem to be key variables of peoples attitude towards bears.

Concerning the utility score, for locals the most important parameters were whether people regarded the bear as dangerous for humans, own negative experience and gender (females being more negative than males) (Table 4). These factors explained 32% of the variation in utility score, with education, study area and urban versus rural environment adding further predictive value. For hunters the two variables, whether or not the bear is dangerous for humans and education, best explained variations in the utility score.

Model fit for knowledge score was rather poor (Table 4). Socio-demographic factors, interest level and presence in the forest only explained 15% of the overall variation. Of the 6 socio-demographic variables tested for, only rural versus urban environment did not add any additional explanatory power to model fit. For hunters, interest level, study area and education were the variables that best explained variation in knowledge score, together explaining 19% of the overall variation in model fit.

Attitude indeed proved to be an important predictor of support for the present policy of bear expansion, at least for locals where it explained 40% of the variation in number score (Table 4). For hunters model fit was much lower, but attitude alone still explained 23% of the variation in number score.

3.3. Relevant issues for bear management

3.3.1. Interest level

Interest level provides a measure how well target groups are reached by public information efforts. Our survey showed that interest level in the bear issue was high, as 59% of hunters and 50% of locals were greatly interested in learning more about bears. Certainty level on the other hand was low, as only 33% of hunters and 9% of locals felt very knowledgeable about bears. The majority of respondents in both target groups agreed that more information (88% of hunters and 92% of locals) and research (70% of hunters and 78% of locals) about bears is necessary in Slovenia. However, interest level was negatively correlated with attitude score (Pearson's correlation coefficient $r = -0.511$ for hunters and $r = -0.475$ for locals; $p < 0.001$). And in a subsample of respondents with negative attitude (attitude score ≤ 2), only 9% of locals and 30% of hunters were interested in learning more about bears. There was no significant difference in the interest level of locals and

hunters between the two study areas (χ^2 -tests, all $p > 0.05$).

3.3.2. Fear of the bear

Utility score and especially the perceived danger bears pose for humans were key factors predicting people's attitude towards bears. In spite of the high attitude score, a fairly high percentage of locals are afraid of bears. Forty-one percent of locals think that bears are dangerous for people and 45% agree that they would be afraid to go into the forest if bears were present. Fewer hunters regarded the bear dangerous (35%) and only 13% would be afraid to go into the forest if bears were present.

A fairly high percentage of locals and hunters had negative experiences with bears. Twenty percent of hunters and locals had felt threatened by a bear and 6% and 26% had experienced damage by a bear within the family and hunting club, respectively. The number of locals and hunters that experienced damages did not differ between study areas ($\chi^2 = 1.071$, $p = 0.301$ for locals and $\chi^2 = 1.019$, $p = 0.313$ for hunters), but significantly more people had felt threatened by bears in the core area as compared to the outer area ($\chi^2 = 14.284$, $p < 0.001$ for locals and $\chi^2 = 78.295$, $p < 0.001$).

3.3.3. Estimate of bear population size, trend and damage caused by bears

Locals and especially hunters in both, the outer area and the core area, opposed a further increase in the bear population size (Fig. 3). An evaluation of the answers concerning the perception of the bear population size and the damage level showed that local respondents consistently underestimated the bear population size and the extent of sheep predation problems in Slovenia, but perceived the bear population trend largely as increasing. Hunters most often estimated the bear population size correctly, perceived the bear population size as increasing, but also underestimated the extent of sheep predation.

3.3.4. Support of the present bear management

Even though locals and hunters did not agree with the present policy of bear expansion, they largely agreed with the present bear hunting regulations, except that hunters were ambivalent to zoned hunting management, whereas locals supported it (Table 5). Both target groups agreed that bears should be eliminated in areas where sheep predation occurs and that farmers should be paid compensation for losses by bears; but only 68% of hunters and 45% of locals actually knew about the existence of a compensation program (Table 5).

Seventy-nine percent of hunters and 61% of locals wrote comments on the open end questions "What is the most important issue concerning brown bear

Table 5

Distribution of answers of the two target groups locals and hunters on questions concerning their support of the present bear management in Slovenia

Target group	Disagree	Neutral	Agree	Majority in accordance with present management
Bear numbers in SLO should be high enough, so bears can move to Italy and Austria				
Hunters	59	18	23	No
Locals	40	32	28	No
Bear numbers should be increased				
Hunters	85	10	5	No clear statement
Locals	56	25	19	By bear managers
Bears should live in all parts of Slovenia				
Hunters	77	9	14	No clear statement
Locals	58	20	22	By bear managers
Bears should only live in restricted parts of Slovenia				
Hunters	14	10	75	No clear statement
Locals	25	14	60	By bear managers
Bear management has to be done together with the neighboring countries				
Hunters	17	11	72	Yes
Locals	7	13	80	Yes
Bears should not be hunted at all				
Hunters	89	6	5	Yes
Locals	48	19	33	Yes
Bears should be hunted year-round in Slovenia				
Hunters	69	7	24	Yes
Locals	58	20	22	Yes
If bears are hunted, hunting should be restricted to specific areas				
Hunters	47	6	47	Ambivalent
Locals	19	17	64	Yes
Bears should be eliminated in areas with sheep problems				
Hunters	31	15	54	No
Locals	26	19	55	No
Money should be paid to farmers that have sheep killed by bears				
Hunters	5	1	94	Yes
Locals	6	6	88	Yes

management in Slovenia?" The topics listed most often by hunters and locals were comments on the distribution range, with most people favoring a restriction of the distribution range. The second most important topic was the number of bears in Slovenia with most locals favoring a "well balanced population size" and most hunters favoring a reduction in the population size. These findings are in accordance with the values for the number score.

4. Discussion

4.1. A high attitude score – can we lean back?

We did not find the expected largely negative attitude towards bears in the outer area. Quite contrary to our expectation we documented a very positive attitude towards bears, in both study areas and for both target groups. Apparently, regional differences in the damage

level per se and the status as a game species are not the driving force shaping attitude towards bears in Slovenia. This is quite contrary to findings from Norway, where a high damage level resulted in a largely negative attitude towards bears, which was most pronounced in the high damage areas (Szinovatz, 1997). On the other hand, damage levels in Slovenia are much lower than in Norway (Kaczensky, 1999) and the positive attitude towards bears is consistent with findings from neighboring Italy (Dupré et al., 1998) and Austria (Korenjak, 1995; Szinovatz and Gossow, 2001).

The low importance of the place of residence might be explained by the small size of Slovenia (~20,000 km²). Many people that live in small villages actually work in the capital Ljubljana or in other larger cities. This high mobility of people may dissolve the social cohesiveness of a region. In addition, few locals stated that they work as farmers (4.4%) and few experienced any bear damage themselves or within the family (6.1%). The proportion of people directly affected by bear

damage in our sample was very small, regardless of residency. Thus target groups should not be identified by region, but rather by how likely they might be affected by bears.

Only 6% of hunters and locals hold negative attitudes (attitude score 1–2) towards bears. However, this group seems to express their attitude louder and more frequently than the majority of people that hold a positive attitude. Furthermore, a small group of people with a negative attitude and having the skill and tools to remove a controversial species may well be able to stop recovery, as has been the case with wolves in Michigan (Hook and Robinson, 1982). Among hunters only peer pressure and self-control, can counteract illegal killings. Before our questionnaire the impression of bear managers was that people in the outer area were very much against bears and are very afraid of bears as compared to people in the core area. Because this small group is frequently present in the media it might change attitudes of people that are unsure and uninformed about bears. Counteracting this process with pro-active public information efforts would be desirable. The high interest level in bears, expressed by respondents in our survey, should help to reach a broad audience. However, people that held a strongly negative attitude expressed only a small interest in learning more about bears, which makes it difficult to reach this group with public information efforts. Experience from other places in Europe show that it is difficult to reach local people holding a negative attitude towards large carnivores with written material, only (Egli, 1998; Bath and Majic, 2001; Bath and Majic, 2001; Kaczensky, 2003). Here regular personal contacts are required between a person accepted and respected by the locals and the managers alike. A successful model are the “bear advocates” established in Austria (Arbeitsgemeinschaft Braunbär Life, 1997; Zedrosser et al., 1999).

4.2. How harmful is the bear – a key issue

The key factor in predicting the attitude score was the perception of how harmful the bear is, with a special focus on how dangerous the bear is for humans. Fear of bears is an important factor for people's attitude in Slovenia (Korenjak, 1995; Logar and Komac, 1999; Prosen, 2001). The same was found for wolves (*Canis lupus*) in North America and Japan, respectively (Hook and Robinson, 1982; Bath, 1991; Kanzaki et al., 1996).

Previous studies have shown, that the actual or perceived bear-people conflict is important to predict people's attitude towards bears (Bath and Majic, 2001; Caluori, 1999; Egli, 1998; Kellert, 1994; Kellert et al., 1996; Kvaalen, 1998). Therefore it is not surprising, that negative personal experience was an important predictor of people's utility score. A high percentage of respondents already felt threatened by bears and the need to be

taken seriously. Here public information efforts are needed. Rather than providing general information on bear biology, information should focus on topics like: How dangerous are bears? What should I do if I see a bear? How to interpret bear behaviour in case of an encounter? How likely is it to encounter a bear? Due to the differences in the knowledge levels of our target groups this information needs to be tailored differently for locals and hunters.

Twenty-six percent of hunters and 6% of locals experienced bear damage within the family or hunting club. Most of these damages included livestock loss, damaged beehives and damages to orchards or fields. People that experienced damage also hold the most negative attitudes towards bears and their management. Hence information about defence measures and support for their implementation are needed. This could be done by a mediator like a “bear advocat”. In addition the compensation system needs to be better advertised, but should be linked to the use of protection measures when possible – as otherwise a reduction in damage will be difficult to achieve (Linnell et al., 1996; Savelli et al., 1998).

4.3. Socio-demographic variables and knowledge level – unimportant altogether?

Socio-demographic variables, place of residence (core area versus outer area and urban versus rural) and knowledge score only played a minor role predicting the attitude score towards bears in Slovenia, which was in contrast to other studies (Kellert, 1985; Bath, 1991; Bjerke and Reitan, 1994; Kellert et al., 1996; Szinovatz, 1997). From the low importance of the knowledge score one should not conclude that knowledge about bears is unimportant altogether. On the one hand it is very difficult to quantify knowledge per se and it might well be specific facts (e.g. information on how dangerous a bear is) and contexts (the complexity of the damage situation) that can make a difference. On the other hand, increased knowledge may not necessarily cause a change in attitude but it may well be a basis to reinforce and rationalize attitudes (Kellert, 1994; Kellert et al., 1996).

Information on the estimated bear population size is readily available in the media, it is, however, difficult to receive information on the distribution and annual amount of bear damage. Most newspaper articles just mention the location and number of sheep killed in a particular event (Kaczensky et al., 2001). Because people actually underestimate bear numbers and the extent of the predation, one can not necessarily expect to change support of the present policy of bear expansion by providing people with more facts. A similar situation exists in Norway, where the knowledge level was negatively correlated with the attitude towards bears (Szinovatz, 1997). A study dealing with attitudes towards

polar bears (*Ursus maritimus*) also showed that people with better knowledge tended to score more negatively than less knowledgeable ones (Bath, 1994). Here a better approach is to explain the complexity of the problem. Bear predation on sheep is increasing in Slovenia, but so is the number of sheep kept in the bear core area. In the bear core area the nature of the present conflict is two opposing management schemes (Krystufek and Griffiths, 2003). However, experience from other countries have shown that a low conflict co-existence of large carnivores and free-ranging or unprotected sheep on forested range is not possible (Kaczensky, 1999).

4.4. Support for the present bear management

As expected, attitudes towards bears proved to be an important variable predicting support of the present policy of bear expansion. However, this finding can be quite misleading as it suggests that a positive attitude also means support of the present expansion policy, which it does not. It only means that there is a strong positive relationship between attitude- and number score; but a moderate attitude score is most often associated with a very low number score, while a high attitude score is associated with a moderate number score. This apparent discrepancy might be explained by the attitude score being composed of questions asking for general value-laden beliefs, whereas the questions of the utility score ask for specific consequences. The same was observed in a study about acceptable options for cougar (*Felis concolor*) management (Manfredo et al., 1998).

Respondents did not want bears in all parts of Slovenia and wanted bears to be eliminated in areas with sheep predation. We believe that most respondents are not aware that bear predation problems are not restricted to the subalpine and alpine areas outside the bear core area and therefore do not know that the consequence of their request would be the elimination of the bear on most of its range in Slovenia. Future public information efforts need to address bear-livestock issues and have to show and explain the complexity of the problem.

At the same time management actions have to target these problems and reduce conflict. It is an illusion to believe that it will be possible to avoid conflicts altogether, but setting up personal contacts and acknowledging peoples concerns may help improve the situation (Sillero-Zubiri and Laurenson, 2001). Several respondents expressed their frustration that Slovenia has to pay the burden, so the neighbouring countries can enjoy having bears. For Slovenia the few bears in the alpine parts of the country are of little importance for the viability of the bear population. On the contrary, they cause a high level of bear-human conflicts and lately threaten the overall acceptance of the species (Krystufek

et al., 2003). From the Slovenian perspective it is much more efficient to translocate selected bears from the bear core area to a desired recovery area in the Alps, thus sparing Slovenia the burden of tolerating bears in high conflict zones (Adamic, 2003; Krystufek and Griffiths, 2003). We thus predict that without international support and financial incentive it will be difficult to guarantee the protection of the bear in the subalpine and alpine areas of Slovenia.

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