
**Human attitudes toward large carnivores
bear, wolf, lynx and wolverine
A case study of Västerbotten County**

Robert Mannelqvist





Examensarbete i ämnet biologi

2010:8

Human attitudes toward large carnivores bear, wolf, lynx and wolverine A case study of Västerbotten County

*Människors attityder till de stora rovdjuren
björn, varg, lo och järv*

En fallstudie av Västerbottens län

Robert Mannelqvist

Keywords: Large carnivores, attitudes, demographic factors, human dimensions, co-management, Västerbotten

Handledare: Göran Ericsson
Examinator: Camilla Sandström

30 hp, D-nivå
Kurskod EX0510

SLU, Sveriges lantbruksuniversitet
Fakulteten för skogsvetenskap
Institutionen för vilt, fisk och miljö

Swedish University of Agricultural Sciences
Faculty of Forestry
Dept. of Wildlife, Fish, and Environmental Studies

Umeå 2010

Abstract

Management of large carnivores involves more than just the management of animals, people also have a large influence. The Swedish parliament decided in 2009 that the county boards should use co-management to a greater extent in management. This shows how important human dimensions are.

We know from previous research that the majority of people in Västerbotten are positive toward large carnivores and the management done by the state, however there is a negative minority which should not be neglected. This paper contributes with an examination of attitudes toward large carnivores, wolf, bear, lynx and wolverine, in Västerbotten County. The data for this study were derived from a survey that was sent out to 150 randomly selected persons in every commune in following counties: Norrbotten, Västerbotten, Jämtland, Västernorrland, Dalarna, Gävleborg and Stockholm. The responses on the different attitude questions regarding large carnivores were analysed and summed to provide an attitude sum. In Västerbotten the distribution of attitudes were skewed toward the positive side. Analysis of explanatory variables showed that: old people, hunters, low educated, females and people with low income hold the least positive attitudes. Also the commune, from which the respondent was from, influenced the attitude. Bjurholm and Vindeln were the most negative communes whereas Vännäs and Storuman were the most positive. Influence of attitudes on the support for different organizations involved in the management of large carnivores was also explored. People with positive attitude tend to be more supportive for environmental organizations and the Swedish parliament people with negative attitude on the other hand were more supportive toward hunters and Sami villages.

Sammanfattning

Förvaltning av de stora rovdjuren kräver att man involverar människorna som ska leva med dessa. Sveriges riksdag beslutade 2009 att man skulle införa en ökad grad av samförvaltning (co-management) i den nya rovdjursförvaltningen som till största delen skall skötas av Länsstyrelserna. De ska ha rovdjursgrupper som ska vara med och diskutera hur förvaltningen ska se ut. Detta visar på hur viktiga människors åsikter är för rovdjursförvaltningen.

Från tidigare forskning vet vi att en majoritet av befolkningen i Västerbotten är positiv till de stora rovdjuren och förvaltningen som sköttes främst av naturvårdsverket, det finns dock en negativ minoritet som man inte ska negligera. Denna rapport bidrar med en undersökning av attityden till de stora rovdjuren varg, björn, järv och lo i Västerbotten. Datat som används i rapporten härstammar från en undersökning som skickades ut till 150 personer i varje kommun i följande län: Norrbotten, Västerbotten, Jämtland, Västernorrland, Dalarna, Gävleborg och Stockholm. Den innehöll bland annat ett flertal frågor rörande den svarandes inställning till de stora rovdjuren, dessa frågor summerades till en attityd summa. För Västerbotten är attityderna till övervägande del positiva. Variabler som kan förklara attityden undersöktes också och det indikerar att: äldre, jägare, lågutbildade, kvinnor och människor med normal inkomst var mindre positiva. Även vilken kommun den svarande var ifrån påverkade attityden, där Bjurholm och Vindeln var de minst positiva kommunerna medans Vännäs och Storuman var de mest positiva. Hur attityden påverkar stödet man ger organisationer som kan tänkas vara med och bestämma i rovdjursförvaltningen undersöktes också. Det indikerade att personer med positiv attityd i högre utsträckning stödjer miljö- och naturskyddsorganisationer samt Sveriges riksdag. De som hade en negativ attityd å andra sidan stödde i större utsträckning jägare och samebyarna.

Introduction

Sweden has signed the convention on biodiversity, the Bern convention and EU's species and habitat directive and is therefore obliged to have all large carnivores in vigorous populations. When I talk about large carnivores in my report I am referring to bear, wolf, lynx and wolverine. The question is no longer if we should have them, but how many and where? Carnivore management of today is not only a scientific matter but even more a political one. Human attitudes rather than natural conditions determine the size and distribution of large carnivore populations (Treves and Karanth 2003, Schneider 2009). It is a political decision and since politicians are elected by people they try to satisfy them. In Sweden it has only been forbidden to hunt large carnivores for 40 years, bear and lynx have occasionally been allowed to be hunted in order to reduce damages. Before 1966 the Swedish state was paying bounties to people who shot a wolf or a wolverine and this system was used for 300 years. Even if the state has decided that the management of large carnivores should change to one that is more aimed towards preservation, it is not sure that the public's normative beliefs have followed these changes (Brå 2007). If there are differing views between the public and the rulers it could easily cause conflicts, a good management is therefore needed. A good management is not only to keep the populations of large carnivores viable it also has to reduce the conflicts. Today the viability of the populations is not the major concern because it is only the wolf who suffers from bad genetics. The three other carnivore species have population sizes above the minimum goal set by the Swedish parliament and are now dispersing over Sweden. The conflict between the rulers and the ruled on the other hand seems to grow only deeper. If people doesn't like the policy that is driven by the Swedish state in this matter it can take the form of illegal hunting which in turn can endanger the survival of large carnivores in the long run. There are three different sources for conflicts in the trace of the carnivore's re-establishment (Brå 2007).

1. A threat against the way of life
2. A threat against the economical industry
3. A conflict between the rulers and the ones that are being ruled

All three contribute to constitute a feeling of powerlessness since people on the countryside, which are living with the large carnivores, don't have any chance to influence the management or the policy. This feeling can lead to a lack of trust for the Swedish government and its agencies, which handle the management (Kellert et al 1996). There are ways to reduce the magnitude of this conflict and increase the acceptance for the management policy. Co-management is one way to do it; co-management can be explained as a process where the government is sharing its management power with different stakeholders/resource users (Berkes et al 1991, Zachrisson 2004). The stakeholders/resource users are invited to take part in the discussion how to manage the large carnivores. In 2006 Annelie Sjölander-Lindqvist conducted a study about Sweden's policy concerning large carnivores, and the local people's perspective and apprehension about wolf. It was a majority of the interviewed people who thought that in order to get higher acceptance for the management one condition is that the local people are given the opportunity to participate and assist in drawing up the management. There is however one problem related with co-management. The problem concerns the democracy aspect because in Fjällmistras report they found that the majority of people are positive towards large carnivores and their management but there is a considerable minority that is negative (Ericsson and Sandström 2005). The question is who is representing the public interest in these questions if the stakeholders with special interest get too much influence/power in the consultations groups (Brå 2007). It is important to make sure that the consultation groups represent the opinion of the majority in order to ensure democracy therefore stakeholders with special interests should not get too much influence/power. However co-management is probably good to use in order to reduce conflicts.

Management of large carnivores is not an easy task since animals do not care about human boundaries and therefore a good cooperation between counties and countries is needed. Management of animals has to be handled by someone who can see the whole picture and knows all the commitments Sweden has against the rest of the world. Therefore it is quite natural that a state agency handles the management. For instance the Swedish environmental protection agency (EPA) has strong support for their management, 85% of the Swedish people think they should be involved in the management (Ericsson and Sandström 2005). Even with this support it can still be wise to take into consideration the opinion of the stakeholders holding negative attitudes. Otherwise it can be hard to gain legitimacy for the rules that has been set up.

There is also a problem with the scale when it comes to opinions regarding large carnivores, on a national level people might be positive but on a local level a majority can be negative. This has been proven both in Sweden (Ericsson and Sandström 2005), Finland (Bisi et al. 2007) and in Norway (Bjerke et al. 1998). Surveys conducted in order to find out peoples opinion might get a huge difference in results depending on which scale they choose. Surveys conducted on commune level do not ensure a representative result for whole Sweden, unless all communes are studied. Surveys based on a proportional sample of Sweden's population would not result in such divergent opinions like the ones based on a smaller scale. Proportional surveys exclude small communes, mainly found in north Sweden, since the population there is too small compared to other parts of Sweden.

It has been shown that there are five main stakeholder groups are involved in the debate; the general public, public in areas with large carnivores, hunters, hunters in areas with large carnivores and conservationists. The public is neutral in most studies and does not hold any strong opinion in these questions (Bjerke et al. 1998, Ericsson et al. 2004, Bisi et al. 2007). This can however change if the public gets direct experience of large carnivores, or if the public is a subject for an education program. Education programs can be difficult to carry through, if people are not interested they are not very likely to attend. Hunters and farmers are the ones that have been proven to be the most negative toward large carnivores, as well as older people and people with low education. Young people, people with higher education (university, etc.) and people in urban areas are more positive in general (Kaltenborn and Bjerke 2002, Randveer 2006). In his national survey about wolves in the U.S., Kellert found that the population there was divided into two sides, positive and negative. The positive side was made up by young adults, people with college education, urban residents and environmental organization members. The negative side consisted of older people, livestock producers, rural residents and people with poor education (Kellert 1985). In this study Kellert also found that hunters and trappers held the most positive attitudes towards large carnivores, however in Sweden we see a different trend with hunters becoming more negative (Ericsson and Heberlein 2003)

Since all Swedish large carnivore populations have increased and exceeded the minimum population limit, which was set as the first intermediate goal, there will be new goals set up. Here Sweden has the chance to change its policy, for this reason stakeholders are trying to lobby for their point of view. The Swedish parliament is not unaffected by this lobbying an example of this is the highly debated wolf hunt that Sweden allowed in January 2010. It was an attempt to make people more positive towards wolves and introduction of new wolves from Russia or Finland. This simple fact showed how attitude can affect policy. It also clarifies the importance of people's attitude when deciding upon matters like these. In the new large carnivore policy some action has been undertaken to increase the co-management (Miljödepartementet 2009).

My purpose with this paper is to find out the attitude towards large carnivores bear (*Ursus arctos*), wolf (*Canis lupus*), lynx (*Lynx lynx*) and wolverine (*Gulo gulo*) of people living in Västerbotten County and to find out which group of people that are holding negative and positive attitude. I will also investigate if the attitude influence the opinion regarding who should manage the large carnivores and in which way. Based on the literature my predictions are following; the people in Västerbotten will be mainly positive towards large carnivores and the ones with negative attitudes will be old persons, people with low education,

hunters, livestock breeders and rural residents. People with positive attitudes will be young, urban resident, higher educated and males. The negative people will think that management should be done by local people, hunters and communes and the ones holding positive attitude will think that the Swedish state together with environmentalists should handle management.

Methods

Data collection

In May 2009 a survey was sent out to 15 317 inhabitants of Sweden representing the ages 16 to 65. The participants were randomly sampled from the national tax board of Sweden's national register, the so called PAR (Person- och Adress-registret). This register contains information about all permanent residents of Sweden and it is updated continuously. In order to get a grip on the scale problem which I described in the introduction, a representative sample for the whole Sweden was selected. The people behind the study also chose to look on a finer spatial scale to be able to capture variation in people's opinion in an area with large carnivore compared to an area without. Therefore 150 people from every commune in the northern part of Sweden were sampled. The northern part of Sweden consists in this case of Norrbotten, Västerbotten, Jämtland, Västernorrland, Dalarna and Gävleborg County with 69 communes in total. Also 150 people in every commune in Stockholm County got the survey in order to see if there is a difference between cities and the countryside. 1067 people were sampled using a proportional sampling of Sweden in order to get a national sample. When we conducted the survey we used four personalized mailings, first a pre-notice card was sent out by bulk mail in the end of May. A week later we sent out the survey with a pre-paid return envelope and also a cover letter explaining why it was important that they filled in this survey. A combined thank you and reminder card was sent out a week after the survey. We also sent out the complete survey a second time with a new cover letter to people who did not answer. Explaining that we did not received an answer yet and that we are sending them the survey again in case it has been lost or not received at all.

Data analysis

For Västerbotten county we got back 1208 surveys from 2250 that were sent out which gives us a response rate of 53, 7%. On a finer scale the response rate for each commune in Västerbotten County ranged from 47 to 59% (see Figure 1; Ericsson and Sandström 2009). The statistical analyses of the collected data were carried out in the software JMP 8, except for the Chi-square test and Mann-Whitney U-test which was done in R and T-tests which were performed in Microsoft Excel. Twelve survey questions regarding attitude toward large carnivores were checked for correlation to see if there was any consistency in the way people answered. The question that was checked for correlations was G1, G2 and G3 (see appendix 1). I used factor analysis to find out if there was any principal component that could explain the variance in answers. The scores on the twelve survey questions were summed up to form an attitude sum ranging from 12 to 64. 1164 respondents have answered all twelve attitude questions. The attitude sum was done by simply taking the number they had crossed in the survey. If they crossed on question G1 "I totally disagree" it equals to the number one and "I totally agree" equals five. This attitude sum was then used in the generalized linear model when I was trying to find out the underlying factors which are influencing the attitude. I used the attitude sum as the response variables and based on the literature presented in the introduction I tested different independent variables to see if they had some significant effect on the attitude sum (Mendenhall 1992). I used the question about if people had bought the state hunting permit, which is compulsorily to have in order to be allowed to hunt in Sweden, as an indicator for hunters. 23, 3 % of the respondents answered yes on this question. In our case the year of birth ranged from 1943 to 1993 and 29 people from the 1208 responses had left this question blank. I

choose to divide the people into three age classes: the ones that are born before 1967 when the hunting of large carnivores were forbidden, those who are born from 1968 to 1983 and finally people born 1984 and last, younger than 25 years old. The decision to do only three age classes has some support in previous research, i.e. old people are more negative and young are more positive (Bjerke et al. 1998, Randveer 2006). The reason that made me choose these specific years as breaks is because I was interested to see if people who were born when hunting of large carnivore was supported by state with bounties have different attitude than people born when hunting was forbidden and large carnivores absent. The question about education had four reply alternatives; mandatory school, craft school, upper secondary school and university. 24 respondents left this question blank. Income had seven alternatives ranging from less than 10, 000 per month to more than 60, 000 per month. 64 respondents left this question blank. I decided to group these alternatives into four groups emanating from the average income for Västerbotten County. The average income for Västerbotten County is 17, 825 SEK (SCB1 2010) but since women earned around 15, 000 SEK and men earned more than 20, 000 SEK in average I decided to let the income levels of 10, 000 SEK to 30, 000 SEK form the group of “normal income”. Below 10, 000 forms the group “less than normal”, 30, 000 SEK to 50, 000 SEK forms the group “more than normal” income and the last group is “a lot over normal” income where belong people who earn more than 50, 000 SEK. When I was checking for differences between different groups of people i.e. hunters and non-hunters I used a standard T-test (Sokal 1995). I compared the two groups to see if the mean of attitude sum in one group was significantly different from the other. In the case of investigating differences between communes I however had to use the Mann-Whitney U-test since the distribution of attitudes sum for each commune did not followed a normal distribution. The variance in every commune sample was also too different to allow T-tests. In this case it was more reliable to use a non parametric test. I then checked the distribution of answers on question G16 (see appendix 2) to find out the support for different organizations. When I compared if the attitude sum had any effect on answers on question G16 I used Chi-squared test (Crawley 2005) and compared the negative people’s positive and negative answer with the positive people’s positive and negative answers for each organization. The grouping of people into negative and positive was done according to answers on the twelve attitude questions. When a respondent had checked negative answers on all twelve questions he or she was categorized as negative, 15% of the respondents were negative. When all twelve answers were positive the respondents was categorize as positive, 42% of the respondents were positive. Since there was unequal number of positive and negative people I used for example the amount of positive people with positive answer, instead of the actual number of positive answer, in the Chi-square test. Otherwise responses of positive and negative would have turned out to be significant different in every case. I decided to investigate the differences only between negative and positive people. The group of neutral people was left out from the analysis since I think it is more interesting to investigate the two outlier groups.

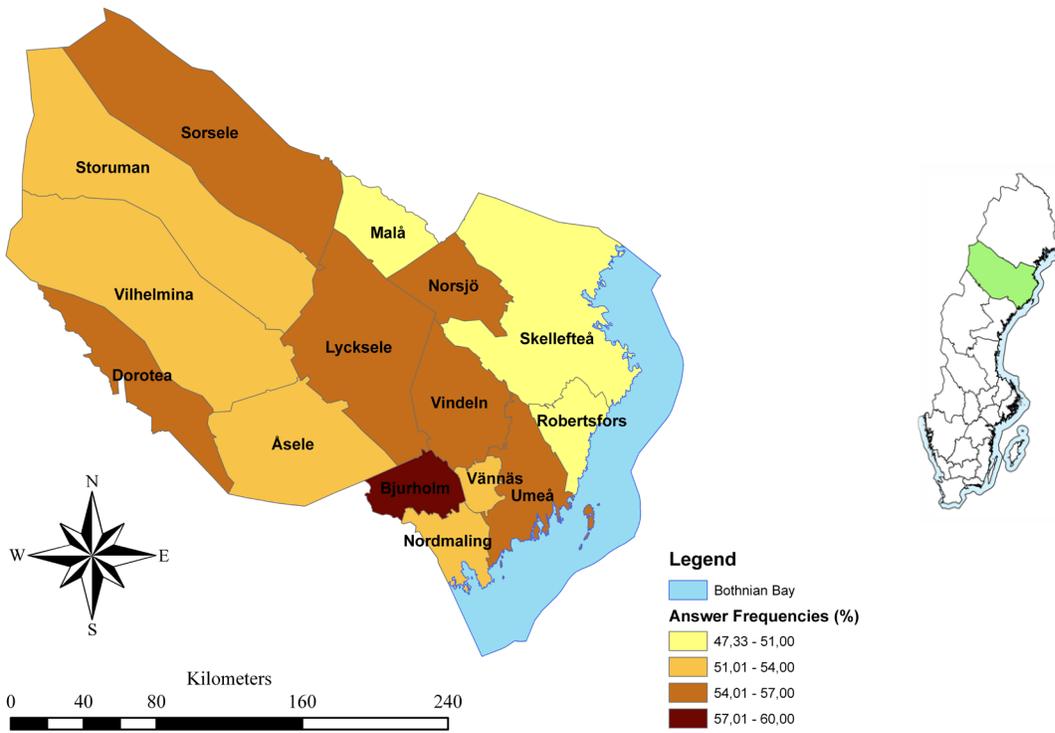


Figure 1. Map showing the location of Västerbotten County (marked with green) in Sweden. The magnification shows all fifteen communes in Västerbotten County and response rate for each commune. Similar results have already been published by Sandström and Ericsson 2009

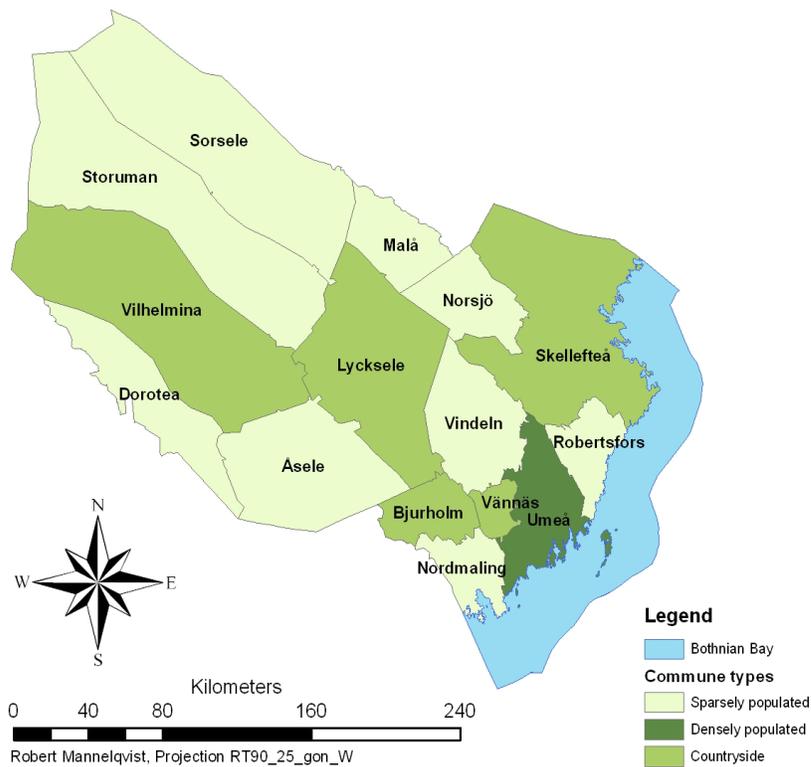


Figure 2. Showing different commune types which can be found in Västerbotten County. The division is done by the rural development agency (glesbygdsverket) and there are three categories depending on number of inhabitants and the distance to nearest city. Sparsely populated communes have at least 30% of the population living in areas with more than 45 minutes, by car, to nearest city with more than 3000 inhabitants. Countryside communes have at least 30% of the population living outside a city with 3000 inhabitants, but less than 30% of the population in areas with more than 45 minutes, by car, to the nearest city. Densely populated communes have more than 70% of the population living in a city with more than 3000 inhabitants (Glesbygdsverket 2010).

Results

Since I wanted to find out people's attitude, in Västerbotten, toward large carnivores I started to investigate if there was any attitude involved at all? As said in the methods part I started by investigation of correlation between the twelve different attitudes questions (Table 1). There is a relatively high correlation between the questions, the correlation coefficient varies between 0.38 and 0.90, and all correlations were significant ($p < 0.0001$) Cronbach's alpha for the test was 0.94, a high Cronbach's alpha indicates that the different questions are measuring the same phenomena in this case attitude. In Table 1 the lowest correlation coefficients are found in column G1_4. The question "what do you think about having wolf in Sweden?" (G1_4) is weakly correlated with three questions, "could you accept to have brown bear close to where you live?" (G2_1), "could you accept to have wolverine close to where you live?" (G2_2) and "could you accept to have lynx close to where you live?" (G2_3). A plausible explanation of this can be that even if people do not like wolves in Sweden they accept having one or all other large carnivores close to where they live.

Table 1. The correlation of answers between the twelve questions regarding attitude towards large carnivores. The question can be seen in their original outline in appendix 1.

	G1_1	G1_2	G1_3	G1_4	G2_1	G2_2	G2_3	G2_4	G3_1	G3_2	G3_3
G1_1											
G1_2	0.80*										
G1_3	0.81*	0.84*									
G1_4	0.73*	0.73*	0.75*								
G2_1	0.63*	0.51*	0.49*	0.38*							
G2_2	0.52*	0.63*	0.54*	0.45*	0.74*						
G2_3	0.53*	0.54*	0.62*	0.45*	0.73*	0.80*					
G2_4	0.58*	0.57*	0.56*	0.73*	0.65*	0.71*	0.68*				
G3_1	0.67*	0.59*	0.60*	0.52*	0.53*	0.47*	0.45*	0.45*			
G3_2	0.59*	0.65*	0.59*	0.56*	0.43*	0.53*	0.45*	0.48*	0.88*		
G3_3	0.60*	0.58*	0.65*	0.55*	0.45*	0.47*	0.52*	0.48*	0.90*	0.89*	
G3_4	0.57*	0.55*	0.57*	0.73*	0.36*	0.40*	0.40*	0.62*	0.78*	0.81*	0.82*

* = $P < 0.0001$

The fact that we have a significant correlation proves that people has not been answering the 12 different question randomly. It shows that people are answering in a certain way i.e. negatively on all or positively. When proceeding by checking for principal component I found that one factor explained 63.8 % of the variation of answers within these twelve questions, adding a second factor would explained another 12 % of the variance. The eigenvalue of factor one was 7.6 and for factor two it was 1.4 so I decided to only use one factor in the continuing analysis.

Table 2. Factor analysis performed on the 12 attitude questions gives us a high consistency in the factor loading which indicate that every question is equally important for the principal component.

Attitude question	Factor loading
G1_1	0.30408
G1_2	0.30312
G1_3	0.30368
G1_4	0.28749
G2_1	0.25568
G2_2	0.27046
G2_3	0.26754
G2_4	0.28066
G3_1	0.29783
G3_2	0.29893
G3_3	0.3009
G3_4	0.28864

In Table 2 the factor loading for the different attitude questions was really similar, varying from 0.25 to 0.30. This indicates that there is a common factor behind the attitude questions based on the fact that people had a consistency in how they answered and that the different question had really similar factor loadings. The factor loading shows how much the actual question contributes to the principal component. With similar factor loadings they are all contributing equally. This allows us to, for each respondent, sum

up an attitude sum from the score on each question and be certain that it actually describes the respondent's attitude toward large carnivores. The sum score ranged from 12 to 64.

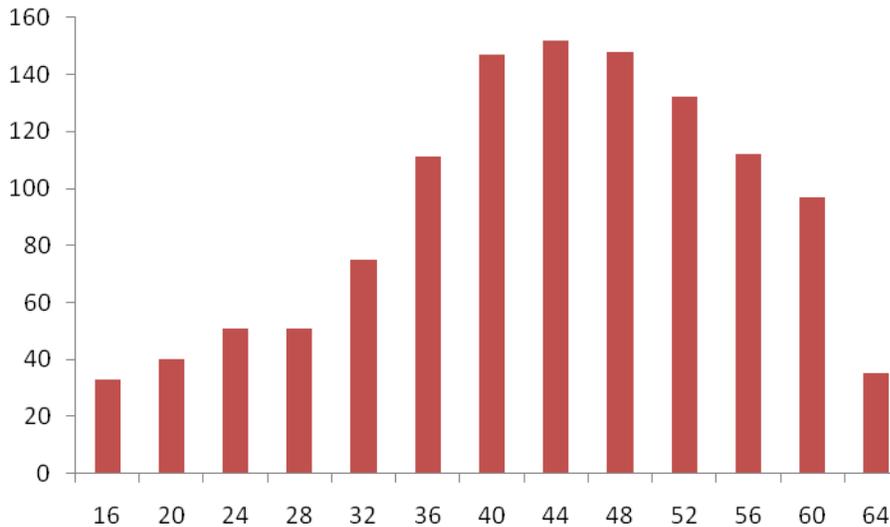


Figure 3. Graph showing the distribution of attitude sum towards large carnivores for the respondents in Västerbotten County. On the y-axis we have the number of respondents and on the x-axis we have attitude sum.

Attitude sum for the respondents in Västerbotten follows a Poisson distribution (see Figure 3) the attitude sum is skewed towards the positive side. In order to make the chart more understandable the 52 different attitude sum has been divided into 13 categories. That is the reason why there is no one in the chart who has sum 12 even though there were in total 13 respondents with such a low attitude sum. The fact that the attitude sum follows a Poisson distribution is important to know when running the Generalized Linear Model (GLM) since there is an option to choose which distribution the role variable has. When running the GLM I found that there were six factors that had a significant influence ($p < 0.05$) on the attitude sum (see Table 3). These six factors were; which commune the respondent are from, if the respondent was a hunter or not, sex, age, education and income.

Table 3. List with six different explanatory variables and their parameter estimates which proved to have significant affect on the attitude sum in the Generalize Linear Model.

Explanatory variables	Estimate	p-value
Commune	0.0004	0.0104
Have you bought the state hunting permit for the hunting year 1 July - 30 June 2008?	0.1038	<0.0001
Are you male or female?	- 0.0867	<0.0001
Which year are you born?	0.0016	<0.0001
Which education do you have?	0.0210	<0.0001
Approximately how big is the monthly income of your household after taxes?	0.0123	0.0028

Table 3 lists the six explanatory variables that were found to significant influence the attitude sum in the GLM. Sex is the only variable that has a negative estimate on the attitude sum this means that with increasing number of females the attitude sum will be lower. Furthermore we can see that the question if the respondent was a hunter or not had the strongest estimate. I thought that the question about size of the respondent's place of residence would be an explanatory variable, but it did not emerge significant in the GLM. Instead I added which commune the respondent were from, this was possible since every survey got a number in order to see which commune the respondent belonged to. I then used the classification I had set up in methods to see how these explanatory variables affected attitude sum.

Table 4. Shows the first five explanatory variables which proved to affect the attitude sum. It also shows the average attitude sum for the different groups and groups where t-test proved significant difference. Upper sec. is a shorting of upper secondary school.

Explanatory variable	Group	Average attitude sum	Groups where difference is significant	p-value
Sex	Men	43.3	Men versus women	0.00041
	Women	40.7		
Age	Old	41.5	Old versus middle	0.0448
	Middle	43.3		
	Young	42.3		
Education	Compulsory	40.9	Compulsory versus university	0.047
	Craft	40.1	Craft versus upper sec.	0.0022
	Upper sec.	42.5	Craft versus university	0.0164
	University	43.3		
Hunter	Yes	39.4	Hunter versus non-hunter	0.00012
	No	42.8		
Income	Low	41.9	Average versus high	0.0162
	Average	41.2	Average versus very high	0.0206
	High	43.1		
	Very high	46,12		

In Table 4 we see that men have a more positive attitude than women toward large carnivores. Old people hold a less positive attitude than both middle aged and young people but it is only the difference between old and middle aged people that was significant. People with lower education such as compulsory and craft school turned out to have less positive attitudes than higher educated people such as upper secondary school and university. Hunters proved to have a less positive attitude than non-hunters and people with average income hold a less positive attitude than people with low, high and very high income. Only between the two latter groups the difference is significant.

Table 5. Show the sixth explanatory variable which is what commune the respondent is from. It also displays the average attitude sum for each commune and communes who were significantly different using Mann-Whitney U-test.

Commune	Average attitude sum	Communes were difference is significant	p-value
Bjurholm	38.7	Bjurholm versus Malå	0.041
Dorotea	41.2	Bjurholm versus Norsjö	0.047
Lycksele	42.4	Bjurholm versus Sorsele	0.023
Malå	42.2	Bjurholm versus Storuman	0.002
Nordmaling	39.9	Bjurholm versus Umeå	0.009
Norsjö	42.3	Bjurholm versus Vännäs	0.001
Robertsfors	41.3	Bjurholm versus Åsele	0.031
Skellefteå	42.2	Storuman versus Nordmaling	0.021
Sorsele	43.0	Storuman versus Vindeln	0.006
Storuman	44.7	Umeå versus Vindeln	0.028
Umeå	43.2	Vännäs versus Dorotea	0.033
Vilhelmina	41.3	Vännäs versus Nordmaling	0.008
Vindeln	39.1	Vännäs versus Robertsfors	0.029
Vännäs	45.9	Vännäs versus Vilhelmina	0.047
Åsele	43.1	Vännäs versus Vindeln	0.002

In Table 5 we see the average attitude sum for each commune and communes which are significantly different. Bjurholm and Vindeln have the lowest attitude sum, close to neutral, and Vännäs and Storuman have the highest attitude sum. The other eleven communes have fairly equal attitude sum. Interesting to notice is the fact that Bjurholm, Vindeln and Vännäs are located next to each other (see Figure 2). The commune with the most positive attitude is actually next to the two communes with the most negative attitude. Bjurholm is also the commune with highest response rate (see Figure 1). In order to see how the support for different organizations looked like I produced a distribution over the answers for the question *who or whom do you think should participate in the management of large carnivores in Sweden?* (G16) Management by local people gets the highest support (see Figure 4). This is closely followed by hunters which are the alternative with the second highest support and on third place is the county board. It is interesting that the Swedish national environmental protection agency (EPA) gets the same support as the alternative commune and they share fourth place (see Figure 4). The Swedish Ornithological Society (SOF) is the organization who gets the highest number of I don't know responses. One interesting figure is that the Swedish society for Nature Conservation (SNF) gets higher support than the Swedish society for Carnivore Conservation (SRF), even though SNF works more broadly with environmental issues and SRF exclusively with carnivore conservation. The Swedish Association for Farmers (LRF) gets the same amount of positive answers as SNF. The high support for carnivore research might indicate that people want the management to be based on scientific knowledge about the animals.

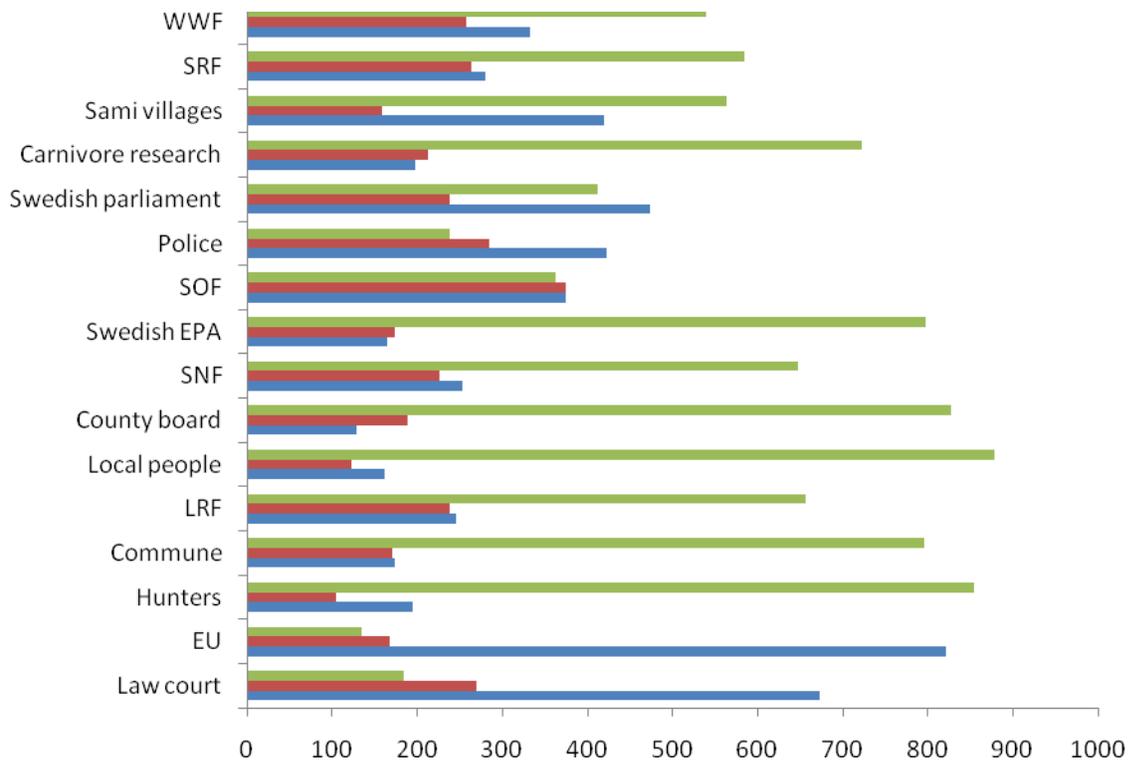


Figure 4. Graph showing the reply frequency for question G16 with the different reply alternatives on the y-axis and the number of respondents on the x-axis. Green represents positive answer, brown I don't know and blue colour represent negative answer. Similar results have already been published by Sandström and Ericsson 2009.

In Figure 4 the five replay alternatives, in question G16, were reduced to three. Where the alternatives *I totally agree* and *I agree* were merged to a single positive answer. In the same way *I totally disagree* and *I disagree* together formed a negative answer and *I do not know* remained the same. From these 16 alternatives are formed seven groups of organizations depending on what kind of organization it is. The groups are following: State management, local management, nature conservationists, hunters and livestock breeders, law, carnivore research and EU. What we can see is that the local management group gets the highest support followed by carnivore research and on third place are hunters and livestock breeders (see Figure 5). The group State management ends at fourth place, this can be because the people want the management to be done close to them. In the group hunters and livestock breeders the Sami villages get almost twice as high rate of the response *I totally disagree* than the two other organizations in that group (see Figure 4). An interesting result is that the four groups, local management, carnivore research, hunter and livestock breeders and state management got from more than 50% of respondents positive answer.

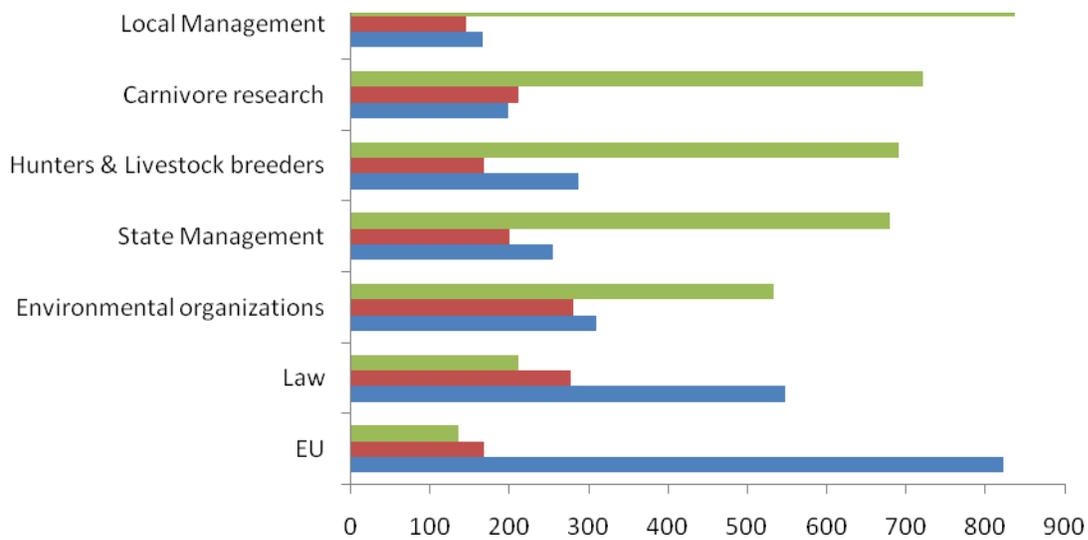


Figure 5. Showing the support for the seven different groups that can be created from the 16 organizations in question number G16 on the y-axis and the number of respondents on the x-axis. Green colour represents positive answer, brown colour I don't know and blue colour negative answer

Group law and EU are the two groups that get more negative than positive, answers: this indicates that people do not want them involved in management. The high support for local management, the two stakeholder groups and state management is very positive since Sweden will implement co-management of large carnivores (Miljödepartementet 2009). Since I wanted to find out if attitude had any influence on how people answered, my next step was to investigate if respondents with different attitude had answered differently on question G16. I found that for some of the organizations this was actually true (see Table 6). There was no clear difference in the support for local management or state management, only the Swedish parliament had significantly higher support from positive people. The big differences were found in support for the different stakeholder groups. Hunter and livestock breeders got higher support from people with negative attitudes whereas environmental organizations got higher support from people with positive attitudes (see Table 6).

Table 6. Shows the result from Pearson's Chi-squared test (p-value) on question G16 where I examined if there is a difference in opinion of positive and negative people towards individual organizations. Furthermore it also shows how many people (in percent) of the two groups have answered the questions positive. * emphasize significant difference in opinion between positive and negative people toward individual organizations.

G16	p-value	Amount of positive people with positive answer	Amount of negative people with positive answer
Law court	0.1892		
EU	0.1213		
Hunters	0.0467*	68 %	79 %
Commune	0.1939		
LRF	0.06155		
Local people	0.0684		
County board	0.08757		
SNF	0.0008885*	65 %	38 %
Swedish EPA	1.686e-05***	81 %	50 %
SOF	0.01038**	39 %	20 %
Police	0.65		
Swedish parliament	0.01084**	44 %	9 %
Carnivore research	2.359e-12***	76 %	38 %
Sami villages	0.286491199	47 %	56 %
SRF	0.000231***	60 %	31 %
WWF	0.1433		

In Table 6 we can see for which organization there was a significant difference in how people answered depending on if they had a low attitude sum i.e. are holding a negative attitude toward large carnivores or if they had a high attitude sum i.e. are holding a positive attitude toward large carnivores. People that hold a negative attitude toward large carnivores are more positive to involve hunter and reindeer herders in the management than people with positive attitude. People with a positive attitude on the other hand are more positive toward involving different kind of environmental friendly and biological conservation organizations than the ones with negative attitude. The biggest difference I found was for the Swedish parliament, where the support is five times higher from the people with positive attitude compared to the ones with a negative attitude.

Discussion

In my study I could see that the people of Västerbotten do not seem to differ that much from people in other countries, at least not when it comes to attitudes toward large carnivores. In my study I was able to confirm that factors proved to influence attitude in other countries influenced the attitude of the people in Västerbotten as well. In Västerbotten factors like which commune the respondent is from, “if the respondent is a hunter or not, sex, age, education and income all influenced the attitude toward large carnivores. Women, older people, people with lower education and hunters hold the least positive attitudes toward large carnivores. This is also true for Norway (Kleiven et al. 2004) Slovakia (Wechselberger et al. 2005) and US (Kellert 1985). On the other hand the result from my study does not support a difference between rural and urban residents which was found in other reports (Kleiven et al. 2004, Wechselberger et al. 2005, Kellert 1985). There was a difference between communes but it does not seem to be connected to the rural-urban aspect. Comparing the communes that had the lowest average attitude sum (see Table 5) and commune type (see Figure 2) I do not see a relationship. A comparison between the most negative

commune, Bjurholm, and most positive commune, Vännäs; reveals that they are both countryside communes (see Figure 2). The low attitude sum in Bjurholm might still be an effect of the Bullmark wolf that was resident in Bjurholm commune from 2006 to 2008. It is hard to say if the reason is the same for the other three communes with low attitude sum. For instance, Vännäs which have the highest attitude sum is a commune just next to Bjurholm (see Figure 2) and it was also affected by the Bullmark wolf which the county board's inventory shows (Länsstyrelsen 2010). Another plausible explanation can be that Bjurholm has older inhabitants, 29 % of the population are older than 65 (SCB2 2010). One thing which I found especially interesting is attitudes of the different age groups. People born before 1967, when all large carnivores could be hunted, and young people hold the least positive attitudes (see Table 4). This suggests that direct experience can have something to do with attitudes. The middle aged group of people was born when carnivores were rare, and was less likely debated in media, are more positive than the group of young people who were born in time when carnivores are debated in media. This could indicate that the media can affect people's attitude if they don't have so much experience regarding the attitude object. Young people that have been growing up during the last two decade, when especially the wolf debate has turned really harsh, might be affected in such a way that their attitude towards wolf and other large carnivores is becoming more negative. Another thing which is interesting is that the people who have finished craft school are the ones that have the most negative attitudes, however the difference from compulsory school was not significant. Regarding the fact that income has an effect on attitude is supported by Kellert's survey 1985 in the U.S., where he found that people of a higher socioeconomic status had a more positive attitude. However in a study done by two economists in Sweden where they investigated the willingness to pay (WTP), for the implementation of the large carnivore policy, it was revealed that more than 50 % of the Swedish population did not want to pay and that the people who had the highest WTP were found in cities (Broberg and Brännlund 2008). Looking at Västerbotten County might be a too fine scale in order to identify a rural – urban difference since there is only one out of 15 communes which is densely populated (see Figure 2). Maybe I did not find this difference because the majority of respondents are living in rural areas and the urban part is too small to be noticed in the sample. Considering the fact that people with high income had a positive attitude and that people with the highest WTP are found in cities leads me to draw a brave conclusion. Maybe the income variable in my survey is explaining for the same factor as the urban – rural in other surveys because there is a connection between income and place of residence at least here in Västerbotten. The commune with the highest income is Umeå (SCB3 2010) which is Västerbottens only densely populated commune (see Figure 2). However Umeå was not the most positive commune (see Table 5) so most likely this theory does not hold, although the thought is interesting. I could not support the idea that if you are a livestock breeder or not influenced the attitude toward large carnivores as I assumed. Maybe there are too few livestock breeders in Västerbotten in order to have an impact on the survey result. Available statistics on the total number of companies that deal with livestock breeding such as cows, pigs, sheep and hens, shows that there were 1066 companies in 2007 (SJV 2010) in Västerbotten. Dividing the number of "livestock breeders" by the total population of Västerbotten, which in 2007 was 257 593 (SCB4 2010), shows that approximately 0.4% of the population in Västerbotten are involved in livestock breeding. These figures do not involve reindeer herders or companies that have horses but anyway it gives an indication of the number of farmers in Västerbotten. This is a really small proportion so it is reasonable to assume that the number of livestock breeders that answered the survey might be too small to be noticed. The connection between attitude and support for organizations who should be involved in the large carnivore management seems to follow the assumptions made in my hypothesis. The people with negative attitudes give more support to the hunter and livestock breeder group, whereas the people with positive attitude more supporting the environmental organizations group. If someone is holding a positive attitude they tend to support organizations which are positive towards large carnivores and the ones with negative attitude support organizations who think that the carnivores should only be present if they do not cause any trouble for the people living in the area. I did not find any difference in support for local management or state management. Only for the Swedish parliament there was a significant difference in support (see Table 6). People want the decision about carnivore management to be done on local level regardless of their attitude. This can be caused by really

good involvement of stakeholders in previous management in Västerbotten County, as was found by Sandström and Lindvall 2006.

My study confirms factors already known to influence attitude, what is then the contribution to existing knowledge? This study presents evidence that these factors are influencing attitude also here in Västerbotten. Attitudes might not be based on the same things from one place to another, or it might not be the same even for different persons living at the same place. It is a lot of values and opinion involved in the construction of attitudes. My first encounter with attitudes was during the course Human Dimension of fish and wildlife where Professor Thomas Heberlein was lecturing about attitudes. I would like to quote professor Heberlein who said *“attitudes are like ghost even if they don't exist you still have to be afraid of them because attitudes are everything”* (Heberlein 2010). This report adds more proof suggesting that this “ghost” we refer to as attitude actually exists. Attitudes are indeed something to be afraid of, it could be argued that the French revolution started because the people had different attitudes than their leaders. In order to gain legitimacy for the management policy, people must accept it. Knowing the attitude of people will make it a lot easier. The more research that finds that sex, age, education etc. have an influence on attitude the more certain we can be that this is actually how it looks. There are no right answers, but the more indication we get pointing toward the same thing the more sure we can be that it is right.

Since there will be co-management of the large carnivores (Miljödepartementet 2009) it can be good to know that the general public in Västerbotten is on average positive, close to neutral, in their attitude toward large carnivores. So if the management is carried out properly the positive attitude might actually increase or at least remain the same. It will be exciting to see what happens in the future. Will the manager be able to handle the negative minorities, and will there once again be breeding wolves in the mountain range of Lapland? Today there is no answer to this question, the answer will be revealed only by time. The human dimension aspect is however of great concern since it is not the natural condition that regulates the number of large carnivores in Västerbotten, it is more political decisions reflecting peoples' will that decides (Schneider 2009). I would like to end this report by quoting Dizard and his book *Going Wild “that in the end, these human dimensions may be more important than technical virtuosity or scientific mastery”*.

Conclusion

In Västerbotten County a majority of the people have a positive attitude toward large carnivores. The more negative people can be found among older people, people with low education, females, hunters, and people with average income. Bjurholm and Vindelns are the most negative communes whereas Vännäs and Storuman are the most positive. Noteworthy is the fact that only 15% of the respondents were negative, 42% were positive and 43% were neutral, hence the biggest group of respondent are neutral toward large carnivores.

Continued monitoring of the attitude in Västerbotten could be of great interest in order to see if the attitude of people will change over the years. What will happen if large carnivores continue to increase in numbers? A similar survey like this one can be sent out every fifth year, it will provide sufficient data to examine changes in attitudes over time.

Acknowledgments

I would like to thank SLU and Göran Ericsson for giving me the opportunity to work with this data set, first with gathering of the data in summer and then analysing it. I also would like to thank John P. Ball at the department for Wildlife, Fish and Environmental studies since he arranged installation of JMP 8 on the laptops of master thesis students for free. This helped me greatly since it allowed me to work at home and not be dependent on SLU computers to do the statistical analysis. He also helped me by dedicating time to

proofread this report. Last but not least I would like to thank Lenka Vysinova for her support and invaluable guidance in the statistical jungle.

References

- Bisis, J., Kurki, S., Svensberg, M., Liukkonen, T. (2007) Human dimensions of wolf (*Canis lupus*) conflicts in Finland. *European journal of Wildlife research*, vol. 53, 304-314.
- Berkes, F., George, P., Preston, R.J. (1991) Comanagement – the evolution in theory and practice of the joint administration of living resources. *Alternatives perspective on society technology and environment*. Vol 18, issue 2 p. 12-18. ISSN: 0002-6638
- Bjerke, T., Reitan, O., Kellert, S.R. (1998) Attitudes toward wolves in south-eastern Norway. *Society and natural resources*, vol. 11, 169-178.
- Broberg, T., Brännlund, R. (2008) On the value of large predators in Sweden: A regional stratified contingent valuation analysis. *Journal of Environmental Management*, vol. 88, 1066-1077.
- BRÅ (Brottsförebyggande rådet) (2007) Illegal jakt på stora rovdjur konflikt i laglöst land? Stockholm: Fritzes. Rapport 2007:22, ISSN 1100-6676.
- Crawley, M.J. (2005) *Statistics: An introduction using R*. John Wiley & Sons, Ltd Chichester England.
- Dizard, J.E. (1999) *Going Wild revised and expanded edition* Hunting, animal rights, and the contested meaning of nature. The university of Massachusetts Press.
- Ericsson, G., Heberlein, T. A. (2003) Attitudes of hunters, locals, and the general public in Sweden now that the wolves are back. *Biological Conservation*, vol. 111, 149–159.
- Ericsson, G., Sandström, C. (2005) Delrapport om svenskars inställning till rovdjurspolitik och – förvaltning. Umeå: Fjällmistra SLU. Fjällmistra-rapport nr 10, ISSN 1652-3822.
- Ericsson, G., Heberlein, T.A., Karlsson, J., Bjärvall, A., Lundvall, A. (2004) Support for hunting as a means of wolf *Canis lupus* population control in Sweden. *Wildlife biology*, vol. 10, nr 4. 269-276.
- Heberlein, T. A. (2010) Attitude book. Unpublished manuscript 2010.
- Kaltenborn, B., P. Bjerke, T. (2002) The relationship of general life values to attitudes toward large carnivores. *Human Ecology*, vol. 9, nr 1, 55-61.
- Kellert, S.R. (1985) Public perceptions of predators, particularly the wolf and coyote. *Biological Conservation*, vol. 31, 167-189.
- Kellert, S.R., Black, M., Rush, C.R., Bath, A.J. (1996) Human culture and large carnivore conservation in North America. *Conservation Biology*, vol. 10, nr 4. 977-990.
- Kleiven, J., Bjerke, T., Kaltenborn, B.P. (2004) Factors influencing the social acceptability of large carnivore behaviours. *Biodiversity and Conservation*, vol. 13, 1647–1658.
- Mendenhall, W., Sincich, T. (1992) *Statistics for engineering and the sciences* third edition. San Francisco, Dellen publishing company Macmillan Inc.
- Randveer, T. (2006) The attitude of Estonians towards large carnivores. *Acta Zoologica Lithuanica*, vol. 16, nr 2. ISSN 1392-1657.
- Miljödepartementet (2009) En ny Rovdjursförvaltning, Informationsblad om proposition 2008/09:210. Stockholm, XGS Grafisk service.
- Sandström, C., Ericsson, G. (2009) Om Svenskars inställning till rovdjursförvaltning. Umeå: Sveriges lantbruksuniversitet. Rapport 2009:2.
- Sandström, C., Lindvall, A. (2006) Regional förvaltning av rovdjur i Västerbotten och Norrbotten - om likheter och skillnader ur ett samförvaltningsperspektiv. Umeå: Fjällmistra SLU. Fjällmistra-rapport nr 18, ISSN 1652-3822.
- Schneider, M. (2009) Managing large carnivores in Västerbotten County. Umeå: Länsstyrelsen Västerbotten, meddelande 2. ISSN: 0348-0291.
- Sjölander-Lindqvist, A. 2006 "Den är ju inte i fårhagen på studiebesök" Om lokala perspektiv och uppfattningar om varg och svensk rovdjurspolitik Rapport 2006:1, ISSN 1653-1264.
- Sokal, R.R., Rohlf, F.J (1995) *Biometry* third edition. New York, W.H. Freeman Company.

Treves, A., Karanth, K.U. (2003) Human-carnivore conflict and perspectives on carnivore management worldwide. *Conservation Biology*, vol. 17, nr 6. 1491-1499.

Zachrisson, A. (2004) Co-management of Natural Resources Paradigm Shifts, Key Concepts and Cases. Umeå: Fjällmistra SLU. Fjällmistra-rapport nr 1, ISSN 1652-3822.

Wechselberger, M., Rigg, R., Be'tková, S. (2005) An investigation of public opinion about the three species of large carnivores in Slovakia: brown bear (*Ursus arctos*), wolf (*Canis lupus*) and lynx (*Lynx lynx*). Slovak Wildlife Society, Liptovský Hrádok, Slovakia.

Internet sources

Glesbygdverket 2010 Glesbygdverkets definitioner av gles- och landsbygder, homepage [online] (2009-03-31). Available from: <http://www.glesbygdverket.se/site/default.aspx?id=3587> [2010-03-06]

Länsstyrelsen 2010 vargar 2006 – 2007 säkra observationer 2006-09-15 – 2007-09-30, homepage [online] (2009-12-02) Available from <http://www.ac.lst.se/naturochmiljo/rovdjur/varg> [2010-03-12]

SCB1. 2010 Genomsnittlig inkomst för hushåll före skatt, statistiska centralbyrån Sveriges officiella statistik, homepage [online] (2009-01-31). Available from: <http://www.ssd.scb.se/databaser/makro/Visavar.asp?yp=tanss&xu=C9233001&huvudtabell=SamForvInk2&deltabell=L1&deltabellnamn=Sammanr%E4knad+f%E6rv%E4rvinkomst+f%E6r+boende+i+Sverige+den+31%2F12+resp+%E5r+%28antal+personer%2C+medel%2D+och+medianinkomst+samst+totalsumma%29+efter+l%E4n%2C+k%E6n%2C+%E5lder+och+inkomstklass%2E+%C5r&omradekod=HE&omradetext=Hush%E5llens+ekonomi&preskat=O&innehall=SamForvInkMedel&starttid=1991&stopptid=2008&ProdId=HE0108&fromSok=&Fromwhere=S&lang=1&langdb=1> [2010-02-22]

SCB2. 2010 Folkmängd i riket, län och kommuner efter kön och ålder 31 december 2009, statistiska centralbyrån Sveriges officiella statistik, homepage [online] (2010-02-17). Available from: http://www.scb.se/Pages/TableAndChart___159277.aspx

SCB3. 2010 Inkomst av tjänst, totalsumma, mnkr efter region, inkomstslag, kön, ålder, inkomstklass och tid, statistiska centralbyrån Sveriges officiella statistik, homepage [online] (2009-01-31). Available from: <http://www.ssd.scb.se/databaser/makro/SaveShow.asp> [2010-03-09]

SCB4. 2010 Folkmängd i riket, län och kommuner 31 december 2007, statistiska centralbyrån Sveriges officiella statistik, homepage [online] (2009-01-31). Available from: http://www.scb.se/Pages/TableAndChart___228181.aspx [2010-03-09]

SJV. 2010 Husdjur i juni 2007, jordbruksverket Sveriges officiella statistik statistiska meddelanden JO20 SM 0801, homepage [online] (2010-02-11). Available from: http://www.jordbruksverket.se/webdav/files/SJV/Amnesomraden/Statistik%2C%20fakta/Husdjur/JO20/JO20SM0801/JO20SM0801_ikortadrag.htm [2010-03-09]

Photos

Wolf, photo by Gary Kramer U.S. Fish and Wildlife Service. Available from: http://www.fws.gov/digitalmedia/cdm4/item_viewer.php?CISOROOT=/natdiglib&CISOPTR=203&CISOBOX=1&REC=4

Bear, photo by Steve Hillebrand U.S. Fish and Wildlife Service. Available from: http://sv.wikipedia.org/wiki/Fil:Brown_Bear_us_fish.jpg

Lynx, photo by David Castor. Available from: http://sv.wikipedia.org/wiki/Fil:Lynx_lynx-3.JPG

Wolverine, photo by Marcus Bengtsson. Available from:
<http://sv.wikipedia.org/wiki/Fil:J%C3%A4rv.JPG>

Appendix 1.

I följande avsnitt ber vi dig att ta ställning till ett antal frågor om rovdjur.

Först möter du påståenden om björn, järv, lo och varg. För några frågor ber vi dig ta ställning till varje enskilt rovdjur.

G1. Vad tycker du om att björn, järv, lo och varg finns i Sverige?

	Ogillar starkt att de finns i Sverige	Ogillar	Neutral	Tycker om	Tycker mycket om att de finns
Björn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Järv	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Varg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

G2. Skulle du kunna acceptera att ha något av de stora rovdjuren i närheten där du bor?

	Nej, absolut inte	Nej, helst inte	Ja, kanske	Ja, absolut	Vet ej
Björn	<input type="checkbox"/>				
Järv	<input type="checkbox"/>				
Lo	<input type="checkbox"/>				
Varg	<input type="checkbox"/>				

G3. Hur viktiga är björn, järv, lo och varg för dig personligen?

	Extremt oviktiga	Mycket oviktiga	Något oviktiga	Varken eller	Något viktiga	Mycket viktiga	Extremt viktiga
Björn	<input type="checkbox"/>						
Järv	<input type="checkbox"/>						
Lo	<input type="checkbox"/>						
Varg	<input type="checkbox"/>						

Appendix 2

G16. Vem eller vilka tycker du ska få vara med och bestämma hur rovdjuren skall skötas?

	Tar helt avstånd	Tar delvis avstånd	Vet inte	Instämmer delvis	Instämmer helt
Domstolarna	<input type="checkbox"/>				
EU	<input type="checkbox"/>				
Jägarna	<input type="checkbox"/>				
Kommunerna	<input type="checkbox"/>				
Lantbrukarnas riksförbund, LRF	<input type="checkbox"/>				
Lokalbefolkningen	<input type="checkbox"/>				
Länsstyrelsen	<input type="checkbox"/>				
Naturskyddsföreningen, SNF	<input type="checkbox"/>				
Naturvårdsverket	<input type="checkbox"/>				
Ornitologiska föreningen, SOF	<input type="checkbox"/>				
Polisen	<input type="checkbox"/>				
Riksdagen	<input type="checkbox"/>				
Rovdjursforskningen	<input type="checkbox"/>				
Samebyarna	<input type="checkbox"/>				
Svenska rovdjursföreningen	<input type="checkbox"/>				
Världsnaturfonden, WWF	<input type="checkbox"/>				

SENASTE UTGIVNA NUMMER

- 2009:1 Användande av avskjutningsstatistik i Förvaltning. Påverkar tidigare jakt CPUE?
Författare: Mirja Lindberget
- 2009:2 En riskanalys av älg nära väg.
Författare: Anneli Stigsdotter
- 2009:3 Produktion av fodermärgkål och klövviltets utnyttjande av viltåker och omgivande skog.
Författare: Lovisa Nilsson
- 2009:4 Vad är de uppskattade totala fångsterna av svenskt fiske i Östersjön 1950-2007?
Författare: Lo Persson
- 2009:5 Brown bear (*Ursus arctos*) den site concealment in relation to human activity in Scandinavia.
Författare: Ellinor Sahlén
- 2010:1 Enumerating Atlantic salmon smolt production in River Vindelälven based on habitat availability and parr densities. – Consequences of using different density estimation methods.
Författare: Stefan Ågren
- 2010:2 Hunter demography, trends and correlates of hunting participation in Sweden.
Författare: Erik Lindberg
- 2010:3 Distribution and community composition of mammals in relation to land use in Botswana.
Författare: Malin Gustafsson
- 2010:4 Influence of the habitat on the potential for cannibalism and population dynamics in stream-dwelling European grayling (*Thymallus Thymallus L.*).
Författare: Carl-Johan Lindström
- 2010:5 Daily rests of wild boar *Sus scrofa* sows in southern Sweden.
Författare: Charlie Persson
- 2010:6 Determinants of winter browsing intensity on young Scots pine (*Pinus sylvestris*) by moose (*Alces alces*) across a bio-geographical gradient in Sweden.
Författare: Lenka Vyšínová
- 2010:7 Reintroduction of the noble crayfish in the lake Bornsjön.
Författare: Susanna Schröder

Hela förteckningen på utgivna nummer hittar du på www.vfm.slu.se