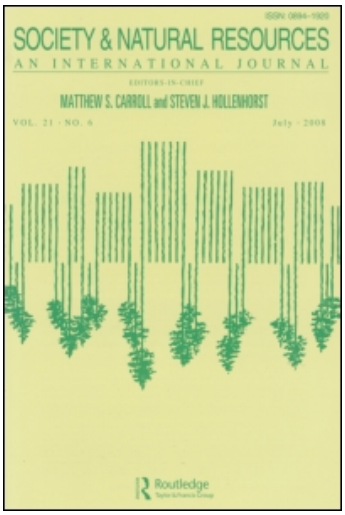

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Wolves as a Symbol of People's Willingness to Pay for Large Carnivore Conservation

Göran Ericsson [a]; Göran Bostedt [b]; Jonas Kindberg [a]
[a] Wildlife, Fish, and Environmental Studies, Swedish University of Agricultural Sciences, Umeå, Sweden [b] Department of Forest Economics, Swedish University of Agricultural Sciences, Umeå, Sweden

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Wolves as a Symbol of People's Willingness to Pay for Large Carnivore Conservation

GÖRAN ERICSSON

Wildlife, Fish, and Environmental Studies, Swedish University of Agricultural Sciences, Umeå, Sweden

GÖRAN BOSTEDT

Department of Forest Economics, Swedish University of Agricultural Sciences, Umeå, Sweden

JONAS KINDBERG

Wildlife, Fish, and Environmental Studies, Swedish University of Agricultural Sciences, Umeå, Sweden

A successful implementation of a mammalian conservation policy requires knowledge of how people value animals. Little is known about how people value large carnivores. The discussion is therefore dominated by people's perception of wolves. In a mail survey (65% response rate) we asked persons residing in areas with populations of wolves, bears, lynx, and wolverines whether they were willing to pay to reach the national conservation goals for those species. We compared 69 Swedish counties with a representative national sample of Swedes living outside the areas with large carnivores. We found that the behavioral intention willingness to pay (WTP) was negatively related to the presence of wolves, to the urban profile, and to opposition against the European Union Monetary Union. We encourage future studies to compare national surveys with local samples in controversial issues to discover conflicting views among national, regional, and local natural resource management stakeholders.

Keywords brown bears, *Canis lupus*, carnivore conservation, experience, *Gulo gulo*, local scale, *Lynx lynx*, NIMBY, rural, symbol, urban, *Ursus arctos*, willingness to pay, wolverines, wolves

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Address correspondence to Göran Ericsson, Wildlife, Fish, and Environmental Studies, Swedish University of Agricultural Sciences, SE-901 83 Umeå, Sweden. E-mail: goran.ericsson@vfm.slu.se

In the 1960s we saw the birth of modern environmentalism, which made many Western countries aware of conservation issues (Carson 1962). For the conservation of large carnivores such as wolves (*Canis lupus*) this was manifested in national legislation in the late 1960s and early 1970s (Williams et al. 2002). Consequently, in countries such as the United States and Sweden, there was an abrupt policy change from paying bounties to complete protection, originating from Carson's book (*sensu* Bekoff and Nystrom 2004). Today the promotion of biological conservation of all species, especially those under threat, is broadly accepted in the Western world, at least on the national level (Kellert 1996; Linnell et al. 2000). In practice, this means that countries within the European Union (EU), such as Sweden, need to develop plans and incorporate those plans into national legislation for many wild species (Naturvårdsverket 2005).

To meet the requirements of international conventions and European Union legislation, Sweden now has a policy with national goals for large mammalian carnivores with minimum population levels. Before those minimum levels are reached, national, regional, and local management opportunities are restricted and can be legally challenged by the European Commission and related bodies. At the time of the present study (spring 2004) there were around 70 wolves (national goal >200), fewer than 1000 bears (*Ursus arctos*; goal 1000), 1200 Eurasian lynx (*Lynx lynx*; goal 1500), and 360 wolverines (*Gulo gulo*; goal 575), in the whole of Sweden (area of 450,000 km^2; Naturvårdsverket 2005).

A problem with implementing a conservation policy is that little is known about how people value other large carnivores apart from wolves and therefore the current discussion is supposedly dominated by people's perception of wolves (for a current example see Kleiven et al. 2004). The symbolic dimensions of wolves and their conservation are key issues when they reappear (Williams et al. 2002; Ericsson and Herberlein 2003). In areas with rebounding wolf populations, or areas proposed as wolf habitats in the near future, local people may see wolf restoration as a symbol of urban dominance, or that they are being suppressed by people with weak or no ties to wildlife (Sharpe et al. 2001; Ericsson and Heberlein 2003). In short, the vast amount of literature from Europe and the United States suggests that local people see pro-wolf sentiments forcing wolf conservation into their areas (for a review and meta-analysis see Williams et al. 2002).

Strong local resistance to rebounding and increasing carnivore populations is a common feature in several parts of the world (Kellert 1985; Linnell et al. 2000; Nie 2001; Williams et al. 2002; Naughton-Treves et al. 2003). Local resistance can be viewed as an expression of the not-in-my-back-yard, or "NIMBY," problem, well known from political science literature, which describes any situation when people do not want an item or issue near their property or where they live (Young 1993). Judging from the literature, a NIMBY situation exists whenever a social change that is desirable from a national point of view (on the basis of a cost-benefit analysis, for instance) meets strong local opposition when a location decision is made by a dominant group in society. Non-wildlife-related examples of such social changes are the construction of power plants and the location of landfills (Portney 1991; Downs 1994).

As suggested in previous studies, people's attitudes toward, and valuation of, large carnivores might be part of general rural opposition to the central powers in big cities as well as specific against one single attitude object: wolves (Sharpe et al. 2001; Enck and Brown 2002). For Swedes, the European Union may be viewed as

the authority that exerts this dominating control in regions (Holmberg 2001) regarding large carnivores. This may have become apparent in the 2003 referendum when Swedes rejected the bill to join the European Monetary Union (EMU). Such a protest may not be trivial. Our previous work has suggested that the remaining variation in studies of attitudes toward wolves, for example, could be explained by including information about attitudes toward the dominating society; for European conditions the EMU project (Ericsson and Heberlein 2003; Heberlein and Ericsson 2005). In this paper we test this novel approach and use the proportion of the population who have a negative attitude regarding the EMU as one way of measuring dissent toward wolves and large carnivores.

Lately, the role of direct experience derived from living with large carnivores has been highlighted (Naugton-Treves et al. 2003; Ericsson and Heberlein 2003; Heberlein and Ericsson 2005). This is in line with central findings in social psychology, where it has been shown that direct personal experience leads to stronger and more central attitudes (Petty et al. 1992). However, surveys conducted so far have failed to show a significant positive relationship between personal experience and large carnivores. Both in the worldwide review by Williams et al. (2002) and in our previous national Swedish survey study (Ericsson and Heberlein 2003), we found that successful wolf reintroductions were likely to reduce people's positive attitudes when they experience real animals. Consequently, we need to consider the situational context as well as the social setting of attitudes toward large carnivores (Kleiven et al. 2004). A situational setting is experience of the animal. Experience in our study was measured by the presence of wolves, brown bears, European lynx, and wolverines in each of the 69 counties. Previously, Ericsson and Heberlein (2003) did not find any relationship with positive experience of wolves, only with negative predation experience. Most people have negative experience in areas where large carnivores live, as they prey on wild or domestic animals, and large carnivores tend to live in rural areas with a low population density, which links back to the sociodemographic findings (reviewed by Williams et al. 2002; Kleiven et al. 2004). Consequently, to understand why people like or dislike wolves and other large carnivores, a survey needs to be made of people in the areas inhabited by large carnivores.

Given the vast amount of published literature, it is evident that wolves in many areas have become a symbol of the divide between urban and rural inhabitants (see Sharpe et al. 2001; Williams et al. 2002; Ericsson and Heberlein 2003). Human dimension research has so far focused on the *national* average attitude toward carnivores as a group (Williams et al. 2002; Kleiven et al. 2004). By working on a spatial scale one or two levels (i.e., regional, national) above the local areas in which large carnivores are part of everyday life, research may thus have involuntarily contributed to this attitude (Ericsson et al. 2006).

The problem of scale is displayed in two ways. First, the metrics differ among the levels: a high level of support in a general national population survey but a significantly different level of support on the regional/state level and the local county level (Ericsson et al. 2006). Second, when analyzing the proposed causal mechanisms between the dependent variables (such as percentage in favor) and the independent variables derived from the literature (rural, experience, knowledge, sociodemographic variables such as age, gender, and income), the qualitative outcome might be different. The latter was apparent in Ericsson and Heberlein (2003), thus suggesting that relying on proportional national sampling when the natural resource conflict is primarily localized could mislead management.

We use a survey-based, stated-preference method, the contingent valuation method (CVM; e.g., Boyle 2003), in our Swedish case study. The rationale behind the choice of a non-market valuation technique such as the CVM is to obtain a measure of willingness to pay (WTP). If we endorse the view that public policy should reflect an understanding of the public's values, and given that public WTP in respect of carnivores is not generally expressed in the marketplace, carnivores become an interesting object for stated preference studies. Valuation studies focusing on carnivores have been made in the United States (Jorgensen et al. 2001; Chambers and Whitehead 2003), Canada (Martinez-Espineira 2006), and Sweden (Bostedt and Boman 1996; Boman and Bostedt 1999). Although it is standard procedure for natural resource economists to address wildlife management issues from an efficiency point of view, the general public and politicians often consider other values to be relevant (Decker et al. 2001). Nonmarket benefit estimation should be viewed as one of the many items of information needed to make an informed decision about natural resource management (Decker et al. 2001).

In this article we focus on the human dimension of the complex issue of carnivore conservation, which is about how people value wildlife from several aspects (Decker et al. 2001). We restrict our analysis to the behavioral intention of people's valuation of wolves, brown bears, European lynx, and wolverines. We test whether and why people are willing to pay to reach the national conservation goal set by the Swedish parliament.

Methods

The Contingent Valuation Approach

The survey-based, stated-preference contingent valuation method (CVM) (see, for example, Boyle 2003) is most commonly used for valuing nonmarket amenities, such as the existence of wild carnivores. The valuation questions asked in CVM studies usually follow one of several possible formats. The so-called Blue Ribbon Panel on Contingent Valuation, convened by the U.S. National Oceanographic and Atmospheric Administration (NOAA 1993), advocated the use of discrete-choice valuation questions. These are questions where the respondent is faced with a bid, rather than asked to reveal his/her willingness to pay (WTP) for an environmental amenity, so-called open-ended valuation questions. In the simplest form of the discrete-choice format (originally suggested by Bishop and Heberlein 1979), the respondent is asked to accept or reject a bid, which is varied over different subsamples, essentially providing point observations of a demand function for the environmental amenity. However, this question format is notoriously imprecise since the only information revealed to the researcher is whether individual WTP is above or below the threshold given by the bid. Furthermore, no information is provided on the preference uncertainty underlying the response. Since the NOAA panel report, considerable research has been devoted to the development of question formats and estimation methods that allow for expressions of uncertainty (Li and Mattsson 1995; Ready et al. 1995; Champ et al. 1997; Wang 1997; Welsh and Poe 1998; Alberini et al. 2003).

If we accept the notion that respondents may be unsure about their preferences, the question becomes one of how respondents answer when confronted with a stated preference valuation question. Following Alberini et al. (2003) we postulate that the

respondent will answer yes to a given bid B if their benefit from doing so, plus some error factor, will exceed the benefit from answering no. This means that the respondent will answer yes if:

$$V(z_1, I - B) - V(z_0, I) > -\xi$$

where $V(\bullet)$ is an indirect utility function, z_1/z_0 is a higher/lower level of the environmental amenity, I is income, and ξ is a negative error function. Note that this error arises from preference uncertainty and not from the researcher's inability to observe all relevant arguments. Naturally, this preference uncertainty can be accommodated in a number of ways in the question format (Li and Mattsson 1995; Welsh and Poe 1998).

Regardless of the type of valuation question used in the CVM study, the researcher is usually interested in estimating mean WTP since, when multiplied by the relevant population, it becomes the theoretically appropriate estimate of aggregate benefits of an environmental amenity. For the more complex multiple bounded discrete choice (MBDC) question the Probit model is used by assuming away the preference uncertainty revealed by the five response options and recoding all responses to yes or no. One way to utilize all the information in the five response options is to assume that the discrete responses (definitely yes, probably yes, unsure, probably no, definitely no) result from a continuous, unobserved variable, which can be called preference certainty. This leads us to the random-effects-ordered Probit model (Alberini et al. 2003, 45), used in this article. The random effects part is used to account for the fact that there is more than one response from each respondent (Kennedy 1998), since each respondent is faced with the whole bid vector.

Survey Data

In a national mail survey we oversampled on the scale of local, Swedish municipality (Swedish "kommun," which is approximately the size of a U.S. county) with populations of large carnivores. We contrasted this with a representative sample of Swedes living outside the areas with populations of large carnivores (Figure 1). At this point we emphasize that the areas with populations of large mammalian carnivores in our study range from urban to rural and that a nonstratified sample would include very few respondents from rural municipalities in the area (Statistics Sweden 2005). Previous research has suggested that national surveys may miss opposing views on the local scale, where large carnivores come into conflict with human interest (Sharpe et al. 2001; Williams et al. 2002; Ericsson and Heberlein 2003). Furthermore, without oversampling one can risk to miss casual relationships among attitudes toward large carnivores and independent variables operating on the *local* level when large carnivores are at the center of a conflict between local and national interests (e.g., Ericsson et al. 2006). We collected data using a mail survey sent to representative samples of the public living outside the carnivore area ($n = 1067$) and the public in the carnivore area ($n = 10{,}350$). We defined the carnivore area as the six northernmost provinces (Swedish "län") with all four large carnivores present, as 60° N also coincides with the distribution limit to the south (see Figure 1; Dalarna (W) 28,193 km^2, Gävleborg (X) 18,192 km^2, Jämtland (Z) 49,443 km^2, Västernorrland (Y) 21,678 km^2, Västerbotten (AC) 55,401 km^2, Norrbotten (BD) 98,911 km^2 in Sweden, 495,000 km^2). Following Ericsson and Heberlein (2003) we focused our

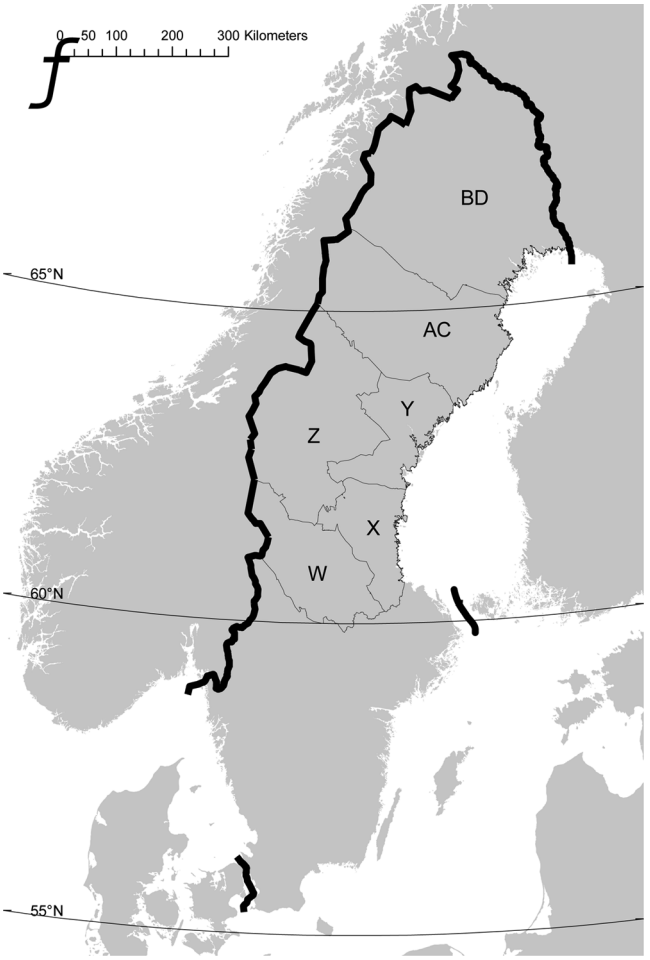

Figure 1. The study focuses on the four mountain regions and two boreal regions inhabited by wolves, bears, wolverines, and European lynx; 60° N marks the distribution limit to the south. The study area contains 16% of the 9,000,000 Swedes on 55% of the country's 495,000 km^2. W: Dalarna; X: Gävleborg; Z: Jämtland; Y: Västernorrland; AC: Västerbotten; BD: Norrbotten. The bold line delimits Sweden from Norway and Finland.

sampling on the scale below the provincial, municipality (approximately county) scale, and sampled 150 persons per municipality. In total, we sampled from all 69 municipalities, ranging from urban to rural (Statistics Sweden 2005), in the six provinces. This means that the sampling intensity was higher in less populated municipalities than in urban municipalities.

We used a mail survey instead of a telephone survey to reduce the potential bias from people giving the socially accepted answer to seemingly controversial questions about carnivores (Dillman 2000). The samples were randomly drawn from the official, national and continuously updated register of all Swedish citizens, and consisted of people aged 16 to 65 years. We used four personalized mailings. The survey was run between Tuesday March 9 (prenotice received by respondents), 2004, and Thursday April 1, 2004 (fourth contact; second complete mailing by respondents).

Overall, 65% useable questionnaires were returned by the respondents. The response rate was significantly higher from carnivore areas (Dalarna 66%, Gävleborg 68%, Jämtland 65%, Västernorrland 71%, Västerbotten 66%, Norrbotten 63%) as compared with the national sample (Rest of Sweden 57%, χ^2 test, $p < .0001$). Because of the high net response rate and since the nonresponse follow-up did not reveal any significant difference between respondents and nonrespondents, we did not weight the data for nonresponse.

In the valuation section the respondents were first faced with the question of whether they were willing to pay (Kriström 1997) to reach the national goals set by the Swedish parliament. "*Now we ask you to value the presence of bears, wolverines, lynx and wolves in Sweden. To increase the number of large carnivores to meet the goals set by the Swedish parliament costs money. We would like to know your opinion about whether you are willing to pay for this. There are different reasons why one is willing to pay or not. Would you be willing to reduce your other expenses to increase the number of large carnivores (bears, wolverines, lynx and wolves)?*" We then exposed those who said that they were willing to pay to the complete bid vector. "*Assume that a tax is implemented to increase the number of large carnivores. Would you be willing to pay the following amount every year over a period of ten years?*" The vector presented contained eight bids: SEK 10, 20, 50, 100, 300, 500, 1500, 3000, and we asked them to mark one of five different certainty levels, definitely yes, probably yes, unsure, probably no, definitely no, for each bid (1 USD = 6.40 SEK, October 2007). The mean WTP for each municipality in each of the six provinces in the carnivore area was estimated by means of province-wise, random effects, ordered Probit estimations, with dummies for each municipality in the province. People in the national sample were treated as one province. No other independent variables, except the bid and the municipality dummies, were used in the province-wise estimations.[1]

Independent Aggregate Data

To test whether the hypotheses reviewed influenced people's willingness to pay for wolves, we received aggregate officially verified data from Statistics Sweden (2005). From the year of the study (2004) we received data from each of 69 municipalities on mean income per capita in SEK, land area in square kilometers, total population, population in the age (years) classes 0–6, 7–15, 16–18, 19–64, 65–74, 75–84, 85+, proportion males/females, educational level, proportion of the urban population in each municipality, and average reported assets for the income year 2003. According to Statistics Sweden, "An urban area consists of a group of buildings normally not more than 200 meters apart, and must fulfill a minimum criterion of having at least 200 inhabitants" (Statistics Sweden 2005). It is important to note that worldwide there are many different definitions of urban (United Nations Statistics Division 2007). Sweden has a much lower threshold than, for example, the United States, which should be kept in mind when doing international comparisons. In 2000, there were 1936 urban localities with a total land area of 5227 km^2, corresponding to 1.3% of Sweden's land area; 7,465,000 or 84% of all Swedes lived in localities classified as urban. In our carnivore study area, 67% of the people live in urban localities. The independent data was tested against the dependent WTP variables. We used carnivore population data provided by the official Swedish monitoring program for large carnivores and population information from the national

carnivore database (Jägareförbundet 2005; Naturvårdsverket 2005) to test whether experience affected the valuation from each municipality.

Analysis

We first performed a correlation analysis to test whether the independent variables were associated (Sokal and Rohlf 1995). To reduce issues of multicollinearity we applied a principal component analysis on the whole data (Sokal and Rohlf 1995). We then tested the relationship between the dependent and the independent variables using a general regression model (Kleinbaum et al. 1987; SAS Institute 1989). We chose the best model on the basis of the partial F test, which tests whether the improvement in r^2 is significant using Type III sums of squares in SAS GLM, which considers all variables to be of equal importance in testing the model (Kleinbaum et al. 1987). We considered $p \leq .05$ to be a significant result if not indicated. All model selection was done manually following the procedures suggested by Manly (2001), avoiding the pitfalls of automatic selection procedures.

Results

The first and third valuation questions asked whether the respondents were willing to pay anything at all to increase the number of large carnivores in Sweden, a yes/no question (Figure 2), and then asked about wolves separately (Table 1). Given the high correlation between the willingness to pay for carnivores as a group and wolves ($r_p = .97$, $p < .0001$, $n = 55$), we could use either of the WTP variables as our independent measure. We chose to use the dichotomous choice (yes/no) WTP for carnivores as a group as our dependent variable in the forthcoming analysis.

Overall, 33.8% of all respondents were willing to pay to increase the number of wolves, bears, lynx and wolverines in Sweden. Note that there is considerable variation among municipalities in the six regions, with the percentage with a positive WTP ranging from 19.8 to 51.1% on the county level. Figure 2 suggests a geographical pattern, with low percentages willing to pay in parts of the carnivore area, although there are also areas with low percentages willing to pay further away from the wolf packs.

The second question asked for the overall WTP amount needed to increase the number of large carnivores in Sweden. Mean WTP for each municipality for respondents answering this question (expressing a positive WTP) was multiplied by the proportion in that municipality with a positive WTP, generating a WTP adjusted for respondents with zero WTP, henceforth denoted adjusted WTP. The geographical distribution of adjusted WTP to increase the number of large carnivores in the carnivore area can be seen in Figure 3.

The final valuation question concerned the WTP in order to increase the wolf population from the present (2004) level to the government goal, using the MBDC technique (see Table 1). The goal amounts to an increase of 300% in the Swedish population of wolves.

We first found a regional effect. Swedes living outside the six regions with carnivores tended to be more willing to pay for carnivore conservation ($p = .057$), as well as for wolf conservation, compared with people in the regions ($p < .065$, Table 1). Least likely to be willing to pay were the inhabitants of the Dalarna region (31%), followed by Västerbotten (33%), Jämtland (34%), Norrbotten (34%), and

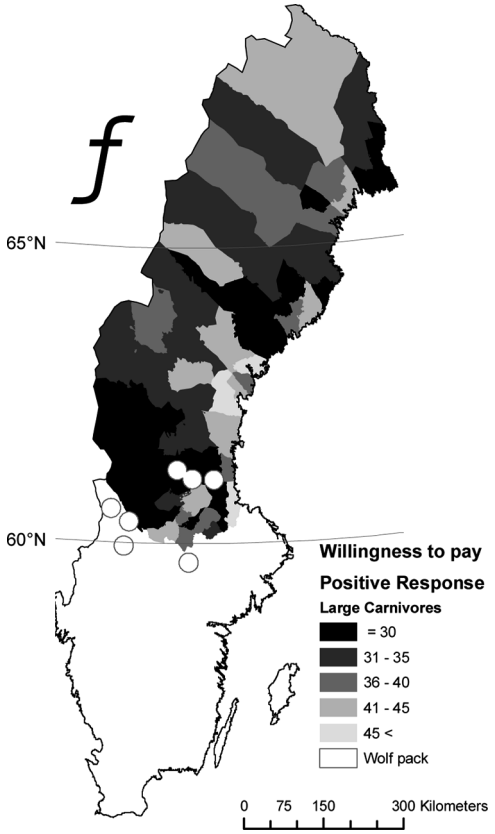

Figure 2. Percent positive in the 69 municipalities in the six regions that were willing to pay ("yes" answer) to increase the number of large carnivores. Open circles indicate breeding wolf packs at the time of the study.

Table 1. Willingness to pay (WTP) for large carnivores as a group and for wolves

Province (län) (number of municipalities)	Proportion willing to pay for carnivore conservation (%)	WTP (SEK)	WTP_{adj} (SEK)	Proportion willing to pay for wolf conservation (%)	WTP (SEK)	WTP_{adj} (SEK)
Dalarna (W) (15)	31	1496	469	33	1192	396
Gävleborg (X) (10)	35	1344	467	35	1175	419
Jämtland (Z) (8)	34	1427	480	35	1123	388
Norrbotten (BD) (14)	34	1430	487	34	1145	396
Rest of Sweden	47	1412	662	47	1360	639
Västerbotten (AC) (15)	33	1224	405	n/a	n/a	n/a
Västernorrland (Y) (7)	40	1479	598	42	1,292	545

Note. The random effects probit model did not converge for the province of Västerbotten region.

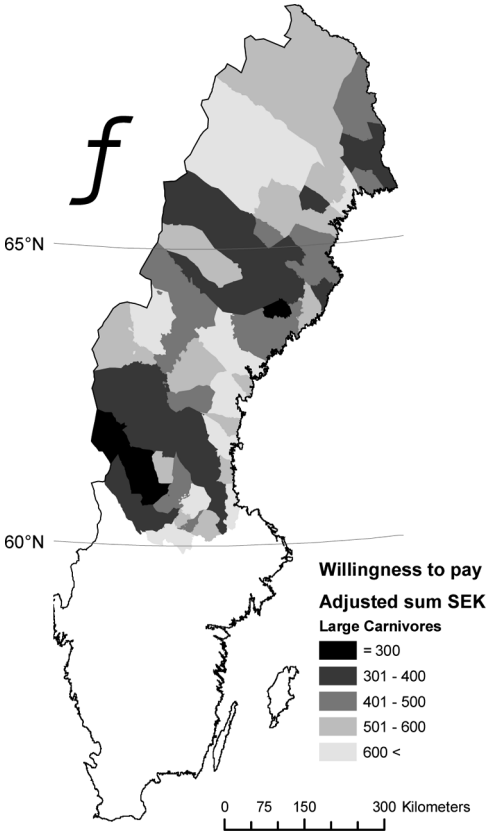

Figure 3. Adjusted willingness to pay (WTP) to increase the number of large carnivores for the 69 municipalities in the six regions that were willing to pay ("yes" answer) to increase the number of large carnivores.

Gävleborg (35%). Most likely to be willing to pay were the inhabitants of the Västernorrland region (40%). The pairwise comparisons between Dalarna and Västernorrland were significant ($p < .05$, Tukey's post hoc test).

To explore any regional differences in WTP, we examined whether socioeconomic variables were related to people's willingness to pay or not. The zero-order correlations suggest that human density, proportion negative to the European Monetary Union (EMU), the proportion of males, level of education, income, and proportion urban could be significant to whether people are willing to pay (WTP) at all ($|r_p| > .38, p < .01, n = 70$, Table 2). The demographic variables (age distribution) capturing potential generation differences were only weakly correlated with WTP or the amount people are willing to pay ($.00 < r_p < .11, p > .38, n = 70$). By applying a principal component analysis (PCA) we reduced the number of independent variables (Table 3). We captured 64% of the variation with an eigenvalue far above 1 (3.84) in our first PC. PC1 was interpretable as an urban county, as it loaded equally positive for fraction urban population, income, university education, and population density (0.41 to 0.44), and loaded equally negative for the proportion of males and the proportion of voters negative to the EMU (-0.40 to -0.35). Urban

Table 2. Correlation between dependent variables (WTP for carnivore conservation and amount in SEK) and the independent aggregate sociodemographic variables

Parameter	WTP (% yes)	Proportion 18–44 yr	Population density	EMU no voters	Males in population	University education	Income	Urban population
Amount (SEK)	.21	.00	.16	−.17	−.18	.16	.27[a]	.28[a]
WTP (% yes)		.11	.41[b]	−.31[b]	−.29[b]	.45[c]	.58[c]	.33[b]
Proportion 18–44 yr			.13	−.06	−.16	.29[a]	.30[a]	.06
Population density				−.63[c]	−.45[c]	.54[c]	.60[c]	.62[c]
EMU no voters					.38[b]	−.56[c]	−.56[c]	−.64[c]
Males in population						−.55[c]	−.50[c]	−.54[c]
University education							.62[c]	.54[c]
Income								.77[c]

[a]Significant at $p < .05$.
[b]Significant at $p < .001$.
[c]Significant at $p < .0001$.

Table 3. Loading and proportion of variation explained in the PCA variable reduction

Variable	Urban county (PC 1; 64% of variation)	PC2 (11% of the variation)
Males in human population (%)	−0.35	0.78
EMU no voters (%)	−0.40	−0.37
Human density (/km^2)	0.41	0.30
University education, 2 yr or more	0.40	−0.26
Income (KSEK)	0.44	0.05
Urban population (%)	0.44	0.12

county correlated highly with WTP ($r_p = .499$, $p < .001$). Our second PC was not as easily interpretable and was not correlated with WTP ($r_p = -.016$, $p = .89$).

In our most parsimonious GLM model ($R^2 = 38.6\%$, DF = 68, $F_{model} = 5.55$ $p_{model} < .0001$) we found that WTP was positively related to urban county ($F = 21.6$, $p < .0001$), and negatively to the presence of wolves in the county ($F = 3.8$, $p = .056$) and the region ($F = 2.6$, $p = .034$). In the 35 counties without wolves, 36% of the respondents were willing to pay for wolf conservation, whereas in counties with wolves present, 33% were willing to pay.

Discussion

Our findings in the present study show that people in rural counties with wolves were least willing to pay for large mammalian carnivore conservation (Tables 1 and 2). We suggest that *not* being willing to pay for wolves and large carnivores is a behavioral intention that may fall under the NIMBY protest heading. Contingent valuation (CV) theory suggests that this type of risk-averse behavior would expect to give rise to reduced WTP in areas where carnivores can expect to cause adverse neighborhood effects. And it did, especially in rural areas with wolves already present.

The Swedish carnivore policy may encounter a NIMBY situation, as the increase in the carnivore population is socially desirable from both a European and Swedish national perspective—which in the case of wolves and Sweden has been shown in a cost-benefit analysis (Boman et al. 2003)—but meets with strong local opposition in areas where the expansion takes place (Ericsson and Heberlein 2003; Heberlein and Ericsson 2005). Our analysis suggests that WTP is lowest where the large mammalian carnivores live, and especially in current expansion areas for wolves (Wabakken et al. 2001). As has been noted by Fischel (2001), persons involved in NIMBY protests may sometimes appear to be irrational in their opposition to these social changes in the sense that they express anxieties regarding neighborhood effects—such as a fear of catastrophic events in the case of power plants, or fear of personal attacks from carnivores—for which the probability is exceedingly small. However, from a scientific viewpoint, merely dismissing individuals as irrational is unsatisfactory, to say the least. Insights into the reasons behind the behavior of "NIMBYists" can be found in the economics of uncertainty. As noted by Fischel (2001), "NIMBY"

protests may be viewed may to fit well into NIMBY terminology as a perfectly rational risk-averse strategy. A risk-averse person would be willing to pay a price to avoid a risk—this is the very basis for insurance—and if this is not possible, due to the absence of an insurance market, the person is instead willing to invest a certain amount of his or her time in NIMBY protests. Having large carnivores around can be viewed as one adverse negative effect influencing everything from real estate prices to a sense of personal safety (see chapters in Duda et al. 1998; Sharpe et al. 2001). A point often raised by the public is that many feel that large carnivore conservation efforts threaten how they have chosen to live their lives (Sharpe et al. 2001; Ericsson and Heberlein 2003; Naughton-Treves et al. 2003). They argue that the presence of large carnivores may limit people's potential to keep free-range animals such as sheep and cattle. Others claim that the presence of large carnivores poses a threat to pets and persons, while some say it reduces the opportunity to be outdoors—all real or perceived adverse effects of having wolves howling in the woods (Duda et al. 1998; Williams et al. 2002; Naughton-Treves et al. 2003). Consequently, as most of the adverse effects may not be possible to counteract with insurance, we suggest that it may pay to protest by stating a no or low WTP to pay for carnivores such as wolves.

Large carnivores normally rebound in rural areas with other socioeconomic problems on people's everyday agenda (Nie 2001; Ericsson and Heberlein 2003). Wolves rarely establish home ranges in the most prosperous areas. Both in the United States and in Sweden they have made a strong comeback in regions and communities previously dependent on natural resource extraction (Sharpe et al. 2001; Wabakken et al. 2001): regions that often may face a downward spiral in terms of job losses, increasing unemployment, migration to the cities, and—for some areas—falling real estate values. Future research needs to address these issues in relation to large mammalian carnivore conservation.

Wolves might carry more weight by not being just one symbol for NIMBY protests against rebounding populations of large carnivores in less populated rural areas. In all NIMBY protests we cannot rule out that wolves symbolize urban dominance over the less fortunate countryside, and that wolf conservation and other biological conservation issues contribute to the suggested divide between urban and rural inhabitants (Wilson 1997; Duda et al. 1998; Nie 2001; Enck and Brown 2002). We suggest that large carnivore conservation issues should be framed in the same way as any other question of how to best transfer income derived from natural resources so that the resource benefits both the resource-hosting areas (rural) and the benefit-seeking areas (urban). As it is framed now, it is a matter of acceptance without any perks for rural people already hit hard by urbanization, unemployment, internationalization, and centralization. With respect to large carnivores, parts of the funds generated by personalized vehicle license plates (e.g., the state of Wisconsin in the United States) for species conservation could be used to develop the local communities, which might lead to improved acceptance of carnivore conservation.

Finally, Sweden has a more liberal definition of "urban" than the United States (United Nations Statistics Division 2007). The lower Swedish urban threshold for the aggregate data might have implications for the significance of the results in our study. However, recent studies using individual data to explore the rural–urban dimensions in the large carnivore context (Ericsson and Heberlein 2003; Heberlein and Ericsson 2005; Ericsson et al. 2006) support that comparisons would remained unchanged if urban were to be reclassified to >10,000 people. Nevertheless,

the urban effect may be observable earlier (i.e., in smaller communities) in a human dimension study in the Swedish society than elsewhere (*sensu* Williams et al. 2002), given the Swedish definition what is urban.

Note

1. Copies of the questionnaire with Swedish original wording and English translation are available from the authors on request.

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