



A quantitative summary of attitudes toward wolves and their reintroduction (1972–2000)

Christopher K. Williams, Göran Ericsson, and Thomas A. Heberlein

Abstract This paper reports an analysis of support for wolves (*Canis* spp.) reported in 38 quantitative surveys conducted between 1972 and 2000. Of 109 records reported in these surveys, a majority (51%) showed positive attitudes toward wolves and 60% supported wolf restoration. Attitudes toward wolves had a negative correlation with age, rural residence, and ranching and farming occupations, and positive correlation with education and income. Thirty-five percent of ranchers and farmers surveyed had positive attitudes toward wolves. Among surveys of the general population samples, 61% expressed positive attitudes. Surveys of environmental and wildlife groups showed an average of 69% support. Surveys in the lower 48 states showed higher proportions of positive attitudes than surveys in Scandinavia and Western Europe, where a majority did not support wolves. Among all surveys, 25% of respondents had neutral attitudes toward wolves. Positive attitudes toward wolves did not appear to be increasing over time. Because attitudes toward wolves are often not strong among the general public, they have the potential to change rapidly if linked to other, stronger attitudes and beliefs. We expect that progress in education and urbanization will lead to increasingly positive attitudes over time. Negative attitudes associated with age are probably a cohort effect, and we should not expect the aging populations in the United States and Europe to lead to more negative wolf attitudes. Paradoxically, successful wolf reintroductions are likely to reduce general positive sentiment, since the presence of wolves gives people a more balanced experience with the animals. Traditionally, people with the most positive attitudes toward wolves have been those with the least experience.

Key words attitudes, attitude change, *Canis*, education, reintroduction, restoration, wolf

Wolf (*Canis* spp.) restoration in the late twentieth century required knowledge of wolf biology and public attitudes (Andersson et al. 1977, Bath and Buchanan 1989, Kellert 1991). The biologists who monitored wolves were joined by social scientists armed with surveys to track public attitudes.

The first published survey assessing attitudes toward wolves was conducted at the Minnesota State Fair in 1972 (Johnson 1974). The most widely cited national survey in the United States was conducted in 1978 and published in 1985 (Kellert 1985a). Today surveys continue in Europe (Bath and Farmer 2000, Bjerke and Kaltenborn 2000).

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Although many surveys indicate that the general public has a positive attitude toward wolves, support varies (e.g., Biggs 1988, Bath 1991, Lohr et al. 1996). Individual surveys found that attitudes toward wolves were more negative among older respondents (McNaught 1987, Pate et al. 1996, Bjerke et al. 1998) and ranchers (Bath 1987, Wolstenholme 1996, Bjerke et al. 1998), yet more favorable among urban residents (Hook and Robinson 1982, Bath 1987, Dahle et al. 1987). The problem with single studies is generalizing their results to the world's overall attitudes. What are the consistent findings in wolf attitude research?

Single studies also fail to capture change over time. Is the public becoming more or less favorable to wolves? No study at one point in time can assess change. Yet the issue of change is crucial. Aldo Leopold's attitude toward wolves took more than 30 years to change (Meine 1988). Have public attitudes changed since wolf surveys began over 25 years ago? Additionally, single studies are often tied to a single place. Do attitudes about wolves and their restoration differ geographically? Only comparative research can answer this question.

Ideally, time-series data on public attitudes toward wolves could be collected in multiple locations around the world, just as biologists regularly estimate wolf populations using standard procedures in various locations. Unfortunately, support from biologists and funding agencies for attitude monitoring over time and comparative data collection is limited, and attitude studies are episodic, usually accompanying some political crisis, such as the Yellowstone reintroduction.

The goal of this paper was to report a quantitative summary of attitude surveys regarding wolves. Metapopulation analysis is often used to integrate empirical findings of studies addressing the same relationship, where similar data across studies are systematically recorded, weighted, corrected, and compared against

moderator variables (Glass et al. 1982). Our goal was more modest—to make a quantitative analysis of the published attitudinal literature to identify the effects of geographic and social variables on attitudes toward wolves and wolf reintroduction. Specifically, we examined whether positive attitudes toward wolves: 1) differed across social groups, 2) differed across geographical regions, and 3) have changed over time.

Methods

We searched 3 library databases (Wildlife Worldwide, Biological Abstracts, and Sociological Abstracts), reviewed bibliographies, and inquired with colleagues who have investigated attitudes toward wolves, thereby identifying 83 research papers that dealt with peoples' attitudes toward wolves and their reintroduction. Of the 83 papers, we rejected 39 because they did not contain quantitative data. Of the remaining 44 that we analyzed, 7 papers reported data based on the same survey and provided no additional statistical results. The remaining 37 papers provided the survey data used in this analysis (Table 1).

The key dependent variable we recorded was

Table 1. Analyzed survey data organized by geographical region, time, and social groups surveyed in each citation used to determine attitudes toward wolves, 1972–2000.

Region Citation	Survey year	Sample
Western US		
Minn 1977	1976	Rocky Mountain National park visitors, residents of Estes Park and Grand Lake, cattle ranchers from Grand and Larimer County, residents of Fort Collins, Loveland, and Granby
Kellert 1985a	1978	Rocky Mountain residents, Pacific residents
McNaught 1985, McNaught 1987	1985	Visitors to Yellowstone National Park
Tucker and Pletscher 1989	1986	North Fork Montana hunters, residents
Bath 1987, Bath and Buchanan 1989	1987	Wyoming statewide residents, stock growers, Wildlife Federation, county-wide residents
Biggs 1988	1987	New Mexico residents, Albuquerque residents, Sierra Club members, New Mexico ranchers
Johnson 1990	1988	Arizona residents, rural households, metro households, hunters, members of Defenders of Wildlife, Arizona Game and Fish Employees
Bath 1991	1990	Montana residents, Idaho residents
Pate et al. 1996, Bright and Manfredro 1996	1994	Colorado residents, East Slope Colorado residents, West Slope Colorado residents
La Vine 1996	1994	Metro Utah residents, northern rural Utah residents, southern rural Utah residents, Utah public land permittees

(Continued)

Table 1 (continued). Analyzed survey data organized by geographical region, time, and social groups surveyed in each citation used to determine attitudes toward wolves, 1972–2000.

Region Citation	Survey year	Sample
Western US		
Duda and Young 1995	1995	New Mexico statewide residents, regional residents
Schoenecker and Shaw 1997	1995	Greenlee County, New Mexico residents
Rooney 1995	1995	Residents around Olympia National Park
Wolstenholme 1996	1996	Residents of rural northwestern Montana
Duda et al. 1998	1997	Wyoming residents
Johnson 1974	1972	Minnesota State fair visitors
Kellert 1985a	1978	North Central United States residents, Northeast residents, Southern residents
Kellert and HBRS 1990, Kellert 1991	1990	Michigan Upper Peninsula residents, Michigan Lower Peninsula residents, Michigan hunters, Michigan Upper Peninsula trappers, Michigan Upper Peninsula farmers
Hook and Robinson 1982	1981	Michigan residents
Kellert 1985b, Kellert 1985c, Kellert 1987	1984	Residents of Twin City, Minnesota, Northern County residents, farmers, hunters, trappers
Rosen 1996	1995	Residents from eastern states
Duda et al. 1998	1996	Adirondack Park residents, New York residents, New England residents
Mangun et al. 1996	1996	North Carolina residents
Wisconsin Wolf Advisory Committee 1999	1997	Wisconsin endangered resources license plate holders, all Wisconsin license plate holders
Duda et al. 1998	1997	Adirondack Park residents
Kellert 1999	1999	Non-northern Minnesota residents, Northern County Minnesota residents, Minnesota farmers
Enck and Brown 2000	1999	New York residents, Adirondack Park residents
Alaska		
Kellert 1985a	1978	Alaska residents
Canada		
Lohr 1995, Lohr et al. 1996	1995	Fredericton Naturalist Club, New Brunswick Federation of Naturalists, Northern New Brunswick deer hunters, Southern New Brunswick deer hunters
Asia		
Kanzaki et al. 1996	1993	Japanese residents
Scandinavia		
Andersson et al. 1977	1976	Conservationists, reindeer owners, livestock farmers, hunters, four regions of Sweden.
Dahle et al. 1987	1987	Norwegian residents
Bjerke et al. 1998	1993	Southeast Norwegian residents
Karlsson et al. 1999	1997	Countrywide Sweden, western residents, reindeer owners, hunters in wolf areas, hunters in nonwolf areas
Lumiaro 1998	1997	Conservationists, urban residents, rural residents, countrywide residents, hunters, and cattle farmers within Finland
Bjerke and Kaltenborn 2000	2000	Residents of Østfold, Akershus, Oslo, Hedmark, eastern Norway.
Western Europe		
Bath 2000	1999	Residents of Des Alpes Maritimes and Savoie, France
Bath and Majic 2000	1999	Residents of Gorski, Lika, and Dalmatia, Croatia, hunters, foresters, and students.
Bath and Farmer 2000	2000	School children in England, Scotland, Wales, Northern Ireland, rural Spain, and semi-rural Spain

attitude toward wolves; 14 of 37 surveys measured only this variable. Despite variability in the nature of the question (e.g., “Which answer best describes your attitude toward the wolf?” Bath 1991; “How much do you care about wolves?” Kellert 1991; “Do you feel that a wolf population has value?” Johnson 1974), the central dimension of the attitude concept was positive or negative (liking or disliking wolves).

In 10 cases, it was not attitudes toward wolves that were measured but rather attitudes toward wolf restoration or reintroduction (e.g., “Do you support wolf restoration in Yellowstone National Park?” Bath 1991; “Do you approve of reintroduction?” Pate et al. 1996; “Would you like to see the Mexican wolf reintroduced into New Mexico?” Biggs 1988). The remaining 13 studies measured attitudes toward both wolves and wolf reintroduction.

Studies often reported summary statistics for various social groups. At a minimum, published studies reported data for a single population, such as the general public in a particular state (e.g., New Mexico, Biggs 1988). More often, a general survey was conducted and data were presented for various subgroups (e.g., rural and urban, northern or southern residents of Utah, La Vine 1996). In other cases, populations or social groups were sampled separately (e.g., Michigan farmers, deer hunters, trappers,

Kellert 1991). Consequently, for each study, we coded the reported statistics for up to 7 different social groups (random sample of state or country, residents in a wolf reintroduction area, city residents, rural residents, members of an environmental or wildlife organization, ranchers and farmers, hunters and trappers). Each survey was associated with one of 6 regions (Western United States, Eastern United States, Northern North America including Alaska and Canada, Asia, Scandinavia, and Western Europe including the British Isles). Additionally, we recorded the year the survey was conducted and the response rate for each survey.

Because data were reported for multiple groups, we were able to code 109 records from the 37 surveys reviewed (Table 1). We had as many as 6 data points from some studies (e.g., Bath and Majic 2000) yet only one from others (e.g., Dahle et al. 1987). Thirty-nine records were obtained for the western United States, 28 for eastern United States, 22 for Scandinavia, 14 for Western Europe and the British Isles, and 5 from Alaska and Canada. Because we found only one record within one study investigating attitudes in Asia, we removed it from analysis. Of the remaining 108 records, 10 records reported data for members of environmental or wildlife groups, 10 for city residents, 45 for random sample of all residents, 9 for residents living in a wolf-reintroduction area, 13 for hunters and trappers, 9 for rural residents, and 12 for ranchers and farmers.

We used the percentage of respondents who expressed a positive attitude toward wolves or wolf reintroduction as the dependent variable ($n=108$). We calculated the average proportion of positive attitudes toward wolves and wolf reintroduction. However, of the 31 records (from 13 studies) that measured the positive attitudes toward both wolves and wolf reintroduction, we found that the 2 measures were highly correlated ($r=0.82$, $P<0.01$). As a result, we treated attitudes toward wolves and wolf restoration as the same attitude object in our analyses. For records where only one measure was given, we listed that value. In records where both measures were given, we averaged the values for both measures.

We compared the effects of fixed factors (geographic region and social group) on attitudes using one-way analysis of variance and Tukey's post hoc comparison test to examine relationships among groups. We compared the effect of the covariate year on attitudes using linear regression. Finally, we

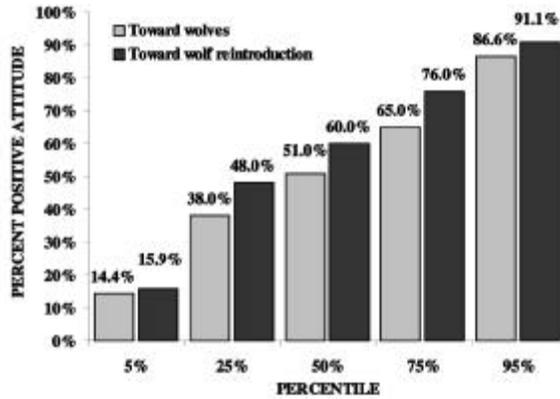


Figure 1. Percent positive attitude toward wolves and wolf reintroduction at 5%, 25%, 50%, 75%, and 95% percentiles, 1972–2000.

determined whether age, gender, education, hunting, residence, occupation, and income had positive, negative, or neutral (not significant) associations with positive attitudes toward wolves and reintroduction. Statistical significance was determined at $P\leq 0.05$.

Results

An average of 51.0% ($SD=20.6\%$, $n=87$) of all respondents had a positive attitude toward wolves and 59.6% ($SD=21.0\%$, $n=52$) of respondents had a positive attitude toward reintroduction. Five percent of records showed less than 14% support of wolves (e.g., southeast Norwegian residents [Bjerke et al. 1998] or public land permittees in Utah [La Vine 1996]) and less than 16% support of reintroduction (e.g., Swedish reindeer owners [Andersson et al. 1977] or northern New Brunswick deer hunters [Lohr et al. 1996]; Figure 1). Additionally, 5% of records reported over 87% support of wolves (e.g., Swedish conservationists [Andersson et al. 1977] or New England residents [Duda et al. 1998]; Figure 1) and more than 91% support for reintroduction (e.g., Swedish conservationists [Andersson et al. 1977] or Arizona Defenders of Wildlife members [Johnson 1990]; Figure 1). The average positive attitude toward both wolves and their reintroduction was 53.1% ($SD=20.6\%$, $n=108$).

Of studies that reported neutral attitudes toward wolves, we found that 24.9% ($SD=14.7\%$, $n=68$) of all respondents had neutral attitudes toward wolves and 16.3% ($SD=9.3\%$, $n=37$) had neutral attitudes toward wolf reintroduction. Five percent of records had less than 3% neutral attitudes toward wolves (e.g., Swedish conservationists [Andersson

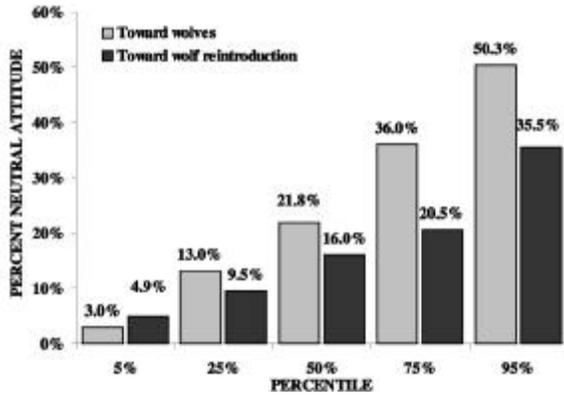


Figure 2. Percent neutral attitude toward wolves and wolf reintroduction at 5%, 25%, 50%, 75%, and 95% percentiles, 1972–2000.

et al. 1977] or New England residents [Duda et al. 1998]) and less than 5% neutral support toward reintroduction (e.g., Arizona Defenders of Wildlife members [Johnson 1990] or Adirondack Park residents during an initial reintroduction proposal [Duda et al. 1998]; Figure 2). Additionally, 5% of records had more than 50% neutral attitudes toward wolves (e.g., Croatian students and foresters [Bath and Majic 2000] or the metro city of Akershus in Norway [Bjerke and Kaltenborn 2000]) and more than 36% neutral support for reintroduction (e.g., Swedish livestock farmers [Andersson et al. 1977] or a random sample of Wisconsin residents [Wisconsin Wolf Advisory Committee 1999]; Figure 2). The average neutral attitude toward both wolves and their reintroduction was 22.9% (SD=13.4%, $n=108$).

A number of studies reported the relationship between social groups and attitudes toward wolves or wolf restoration (Table 2). Where an age relationship was reported, attitudes were negative in 18 out of 19 cases, and rural residents were negative in

Table 2. Summary of number of studies examining relationships between social and economic factors and attitudes toward wolves and wolf reintroduction, 1972–2000.

Group	Number with significant negative relationship	Number with nonsignificant relationship	Number with significant positive relationship	Percent positive relationship
Age	18	1	0	0%
Rural	10	2	0	0%
Ranchers	7	1	1	13%
Males	7	6	3	19%
Hunters	3	1	5	55%
Income	0	2	4	67%
Education	0	2	18	90%

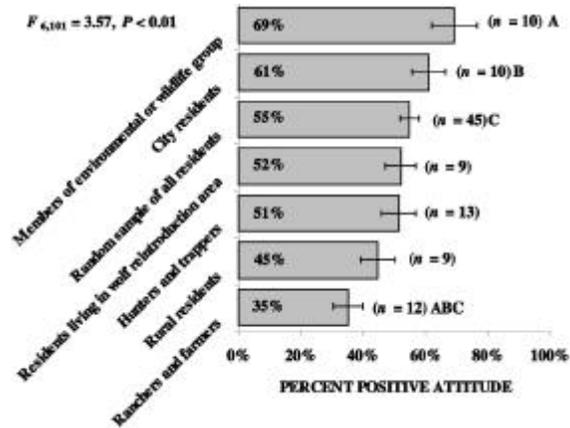


Figure 3. Percent positive attitudes toward wolves and wolf reintroduction across social groups, 1972–2000. Like letters following means are different (Tukey’s procedure, $P \leq 0.05$).

10 out of 12 cases. In the studies that reported relationships between ranchers and wolves, 7 out of 9 had negative attitudes. When education was investigated, 18 out of 20 studies found positive attitudes were associated with higher education. Females, hunters, and those with higher income were generally more positive about wolves (Table 2).

Positive attitudes toward wolves and wolf reintroduction differed among social groups ($F_{6,101} = 3.57, P < 0.01$, Figure 3). Post-hoc tests indicated that members of environmental or wildlife groups (69%), city residents (61%), and random samples across countries or states (55%) had higher positive attitudes than ranchers and farmers (35%). Residents living in reintroduction areas (52%), hunters and trappers (51%), and rural residents (45%) did not differ among other groups (Figure 3).

Percent positive attitudes toward wolves and wolf reintroduction differed among geographic



Penny Rodrick-Williams shows a positive attitude toward a wolf while interning at Wolf Park, Indiana. Photo by Marty Sloan.

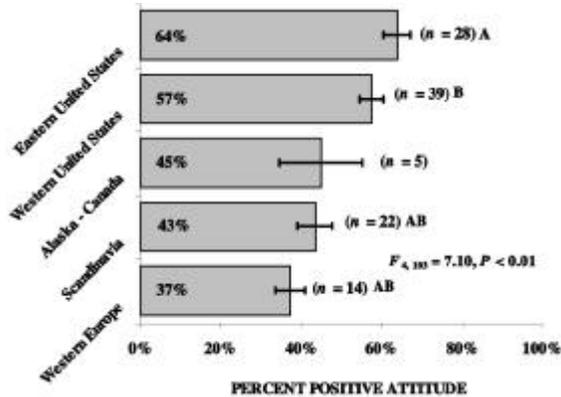


Figure 4. Percent positive attitudes toward wolves and wolf reintroduction across world geographic regions, 1972-2000. Like letters following means indicate difference (Tukey's procedure, $P \leq 0.05$).

regions ($F_{4,103} = 7.10, P < 0.01$, Figure 4). Attitudes reported from the Eastern (64%) and Western United States (57%) were significantly higher than Scandinavia (43%) and Western Europe (37%). Attitudes of residents in Alaska-Canada (45%) did not differ with any other region.

Of 108 records analyzed, 84 were from populations in regions where wolves were not present in the local region, while 24 were from populations where wolves were already present in the region. Average support for wolves and wolf reintroduction was higher among people who did not live in an area with wolves ($56.1 \pm 2.1\%$) than among people who lived near wolves ($42.6 \pm 4.8\%$, $t_{106} = 2.91, P < 0.01$).

The bivariate relationship between time and attitudes was negative ($R^2 = 0.063, P = 0.009$, Table 3, Model I). When 3 social characteristics were added

Table 3. Effect of time, social, and geographic variables on positive attitudes toward wolves and wolf reintroduction, 1972-2000.

Regression variables	Unstandardized coefficients					
	Model I		Model II		Model III	
	b	SE	b	SE	b	SE
Constant	13.665	4.933*	12.686	4.621*	5.800	4.515
Time	-0.006	0.002*	-0.006	0.002*	-0.003	0.002
Member of environmental group			0.136	0.068*	0.158	0.063*
General population			-0.002	0.043	0.003	0.040
Rural resident, rancher, or farmer			-0.154	0.053	-0.144	0.049*
Lower 48 states					0.219	0.082*
Scandinavia and Western Europe					0.060	0.086
Model R^2	0.063		0.204		0.346	
Model significance P	0.009		<0.001		<0.001	

* Indicated significance of component ($P \leq 0.05$).

Albuquerque Journal July 16, 2000
Wolf Program Pits Neighbor Against Neighbor
 Gila Hot Springs - Isolation normally binds together this tiny community of a few dozen homes, in division.
SOUTHWEST RANCHERS RESIST SHARING LAND WITH WOLVES a lamb June 15 its suspected the

The Oregonian Nov 22, 1998
Adirondackers crying no wolf
 TIM MOLLOY
 The Associated Press Times Union; Albany; Dec 17, 1998; FRED LEBRUN

Mexican gray wolves returned to wild, despite outcry of ranchers
 Milwaukee Journal Sentinel; Milwaukee; Dec 12, 1998; MICHELLE RUSHLO

WOLF REINTRODUCTION HAS RANCHERS ON EDGE

Columbian; Vancouver; Nov 22, 1998; TIM MOLLOY, Associated Press writer
 ALPINE, Ariz. - LaMar Clark's grandfather grazed cattle on the same land Clark does today, under the same blue skies and skinny ponderosas. For 100 years, Clark said, his family got along fine raising their herds in the Apache National Forest woodlands surrounding their ranch.

Norway: 'Urban-Versus-Rural' Battle Being Fought Over Wolves

Albuquerque Journal Dec 18, 1998
Ranchers Again Protest Wolves
 Coalition Files Motion Against Reintroduction
 Mike Taugher Journal Staff Writer

Anchorage Daily News Nov 23, 1998
RANCHERS SAY WOLVES UNWELCOME

Tim Molloy The Associated Press

Denver Post Feb 1, 1995
Killer wanted in shooting of imported wolf Idaho rancher says he didn't fire at animal

These newspaper headlines illustrate negative attitudes toward wolf reintroduction.

as independent variables, positive attitudes were negatively affected by time; positively affected by membership in environmental groups; negatively affected by being a rural resident, rancher, or farmer; and unaffected by membership in the general populations ($R^2 = 0.204, P = 0.001$, Table 3, Model II). When we included region (Table 3, Model III), the R^2 value increased to 0.346 ($P < 0.001$) and the model showed residents of the lower 48 states, along with members of environmental groups, were more positive toward wolves, while the rural and agricultural samples remained

more negative. Time was no longer significant, suggesting that the distribution of reported statistics across region and social groups accounted for the negative relationship with time. It is safe to say, however, that attitudes toward wolves have not become more positive over time.

Discussion

In most cases, the general public in the lower 48 United States had positive

attitudes toward wolves, whereas attitudes were more negative in Scandinavia and Europe, where residents have had more experience with wolves. For example, the most positive support for wolves and for wolf reintroduction came from residents of cities and members of environmental groups (Andersson et al. 1977; Bath 1987; Kellert 1987). Social groups with higher potential for direct experience (e.g. farmers, ranchers, people living in rural areas or in areas where there are wolves) tended to have more negative attitudes (Bath 1987, Kellert 1987, Biggs 1988).

Attitudes also varied with other social characteristics. People with higher levels of education had more positive attitudes. Most likely this was because increased education often brings a greater awareness of wildlife and the environment (Kellert 1980). Older people consistently had more negative attitudes. Males tended to be more negative than females and hunters more positive than the general population.

Across the 37 attitude surveys we studied, the reported statistics were stable over the last 30 years. This contradicts a recent perception among some ecologists that wolf support has recently grown (e.g., Wabakken et al. 2001). Although it is clear that attitudes toward wolves have become more positive in the twentieth century, it appears that the change came between the 1930s and 1970s in the United States. During the 1920s, the National Park Service attempted to kill wolves in Yellowstone National Park, whereas by the 1990s they were flying them into the park in fixed-wing airplanes (Sellers 1997). Aldo Leopold's change from advocating extirpation of wolves before 1920 to supporting wolf preservation in the 1940s has been noted and widely discussed (Flader 1974, Meine 1988). In Sweden, wolves were subject to a bounty up to the day before they became protected on 1 January 1966 (Andersson et al. 1977). Because of the consistency in the studies between 1972 and 2000, we think it likely that positive changes in attitudes toward wolves came before social scientists began conducting scientific surveys in the 1970s.

Our analysis of published surveys showed about 25% of respondents were neutral about wolves. This baseline is consistent with current results (T. A. Heberlein, M. A. Wilson, R. C. Bishop, and N. C. Schaeffer, University of Wisconsin, personal communication; T. A. Heberlein, and G. Ericsson, Swedish University of Agricultural Sciences, personal com-

munication). These authors reported that while the general public in northern Wisconsin and Sweden favored wolves, attitudes toward wolves were not strong. For example, in Wisconsin, where more than 30% reported neutral attitudes toward wolves, residents were much more concerned about water quality, nature protection, and native natural resource use than they were about wolves. Attitudes that are not strong may be susceptible to change, although they can be stable in the absence of outside influences (Petty and Krosnick 1995).

Although the statistical average of attitudes toward wolves in single studies was relatively stable over the period of our analysis, one set of studies we reviewed documented considerable change in a relatively short time. In New York, initial surveys of Adirondack Park residents showed that 76% supported wolf restoration in 1996. However, when local community leaders reframed the issue from nature restoration to outside influence, support dropped to 46% in 1997 (Duda et al. 1998) and was at 42% in 1999 (Enck and Brown 2000). Because attitudes toward wolves often are not particularly strong or well developed, it was possible to see strong attitudinal shifts among the general public in this New York case.

Attitude change over time is one prominent question raised by managers and debated in the literature (Bright and Manfredi 1996). We think the result of our analysis contributes to this discussion. Interestingly, two factors point toward increasing positive attitudes in the future and two point in the opposite direction.

First, as the public gains more education, particularly environmental education, we expect attitudes toward wolves to become more favorable. Second, since the data consistently showed that those with less experience with wolves had the most positive attitudes, we expect that as the number of people employed in agriculture continues to decline, more people live in cities, and the public becomes more isolated from nature, attitudes toward wolves will become more favorable.

On the other hand, the American population is aging and the data consistently showed that older people had more negative attitudes toward wolves. Thus, attitudes should become more negative in the future. However, we hypothesize that the consistent age effect is actually a cohort effect. This group, in their 50s and 60s today, formed their attitudes about wolves during a time when attitudes of the general public were significantly more negative

than they are now. We expect these negative attitudes to decline as those who were socialized when public attitudes were more positive replace the older population. This hypothesis has not yet been carefully tested in the wolf-attitude literature.

Paradoxically, it appears to us that successful wolf reintroduction and restoration will itself reduce the general positive attitudes toward wolves. There is some reason to expect that attitudes in the areas where wolves are returning may possibly become more negative as people gain experience and interact with wolves. Surveys in 1976 in Sweden (Andersson et al. 1977) showed more support for wolves among hunters than in a recent 2001 study (G. Ericsson, Swedish University of Agricultural Sciences, and T. A. Heberlein, University of Wisconsin, personal communication). In 1977 there were no wolves in Sweden, and it was expected that if they were restored, they would be restricted to the tundra areas in the far north. However, in 2001 wolves had moved into southern (Värmland) as well as central Sweden and attacked hunters' dogs and killed livestock. In May of 2001, a wolf was sighted in downtown Stockholm. This direct experience gives the public a more balanced picture of wolves and the risks they pose to human activities (e.g., hunting, farming, and even strolling in city parks). In Sweden, general public and even hunter attitudes toward wolves and their right to exist are still positive, but not as positive as they were more than 20 years ago.

Management implications

In general, managers can assume favorable attitudes toward wolves among the public at large. On average, at least 6 people out of 10 will support wolf restoration. However, wolves may not be of overwhelming importance and the favorable attitude will not be based on large amounts of information. Consequently, certain factors could complicate future reintroductions. First, there is always some risk that the public could change its generally positive attitudes if wolf restoration were linked to other, more important attitudes or new experiences. Second, despite the potential for attitudinal change, some social groups are resistant to change. For example, the attitudes of farmers, livestock owners, and rural residents who have direct experience and identities are likely to be negative. This is because wolves may affect their economic interests or are a symbol of urban dominance. In the lat-

ter case, the pro-wolf interests of the dominant urban society could be seen as being forced on rural people and wolves could become another domain for a much larger conflict. This does not mean it is appropriate to ignore rural interests, but we must realize that wolf restoration and its discontents are tied to society as much as to biology. Consequently, if managers wish to improve wolf populations in rural environments, they should recognize that attitudes toward wolves, tied to economic interest and broader ideological conflict, will change very little, and such social groups will not be susceptible to education campaigns. However, we encourage managers to open dialogues with the general public (especially females and those with higher levels of education and income) and hunters and trappers. Such groups either do not necessarily oppose wolves or wolf restoration or are consistently supportive of wolves, and may be the best allies in developing wolf management programs.

The world's attitudes toward wolves are diverse and complicated, paralleling divisions on the values of wilderness, wildlife, and land use (Kellert 1985a). Although our analysis showed general support for wolves, substantial variance still exists. This meta-analysis showed a number of consistencies with previous summaries. However, we encourage managers to remember that "meta" does not mean "average" and region-wide summaries should not be used as a substitute for looking at a single study. To judge past and future support, we encourage managers to always examine past single studies that would most relate to their region or social groups of concern.

Finally, we urge researchers to investigate the role of time in attitudes toward wolves. The data presented in this paper should be useful to compare statistics from new attitude surveys to determine whether a population is more or less favorable than the 25-year average. We believe that past cross-sectional attitude surveys with clear and replicable sampling designs need to be replicated today on comparable populations. Samples of people who are susceptible to selection bias (e.g., those who come to meetings, are members of organizations or are surveyed at state fairs or other public events) will not be sufficient to assess change. Ideally, future research should include following up, in a panel design, those who were surveyed in the past. Investigators who have kept the names and addresses of people surveyed 10 or

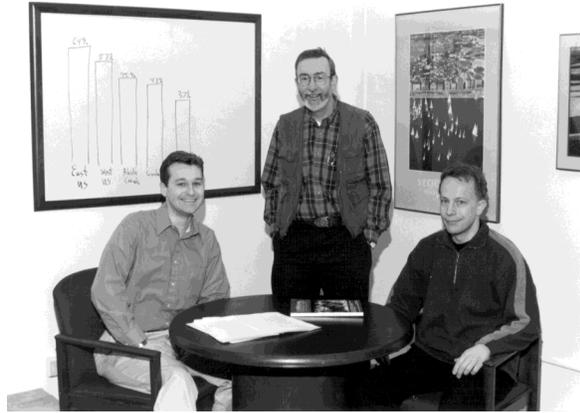
more years ago are encouraged to seek funds to relocate and re-survey these people. This is the best way to measure change and determine whether the consistent negative relationship between age and attitudes toward wolves is a cohort effect. We mark and recapture wolves, but we will never fully understand attitudes and attitude change until we sample and resample the same individuals.

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