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Attitudes toward wolves in the United States and Canada: A content analysis of the print news media, 1999-2008

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Abstract

Several trends indicate public attitudes toward wolves and other charismatic wildlife changed during the 20th century. However, recent empirical studies indicate relative stability in attitudes toward wolves—at least in recent decades. We analyzed ~30,000 evaluative expressions about wolves in US and Canadian print news media over a 10-year time period (1999 to 2008), and classified each expression by type and valence (i.e., positive, negative). Results show an increase in the percentage of discourse about wolves that is negative. Additionally, discourse varied by exposure to wolves: states with new wolf populations had significantly more negative expressions per article than states and provinces with permanent wolf populations, and states in federal recovery zones that lacked wolves had more negative expressions than states outside of recovery zones. Results suggest that even the anticipated presence of wolf populations alters social discourse about the predator, which could impact attitudes toward wolves over time.

Key words: Content analysis, news media, attitudes, beliefs, wolves

Introduction

Gray wolves (*Canis lupus*) are arguably the most charismatic *and* controversial wildlife species in North America. To some they are a symbol of the wild and a bellwether for public support for the restoration of endangered species, while to others they are "unrepentant killers" of wild ungulates and domestic livestock. Our history with wolves in the U.S. underscores this dichotomy. Once "hunted and killed with more passion than any other animal in US history" (Morell, 2008, p. 890), wolves now stand on the precipice of recovery largely because of human efforts to protect and restore the species.

Early settlers killed wolves not only for pragmatic reasons (e.g. protecting livestock), but also out of fear and loathing for a species that had been demonized for centuries in folklore and myth (Lopez, 1978). Both federal and state governments provided financial incentives—in the form of bounties—to those who killed wolves in order to encourage eradication (Lopez, 1978). In Montana, for example, more than 4,000 wolves were turned in for bounty in 1903; by 1927 this number had dropped to zero, signifying the functional end of wolf populations in the state (Riley, Nesslage, & Maurer, 2004). By the 1930s, wolves were extirpated from more than 95 percent of their historical range in the U.S. (Morell, 2008) and by the 1970s only the remote wilderness areas of northern Minnesota and Isle Royale National Park in Michigan continued to support wolves in the lower 48 states (Mech, 1995). Yet wolf populations persisted throughout Canada and Alaska, where human populations were not large enough to eradicate the species.

Following the passage of federal legislation in the late 1960s, wolves became a federally-protected species in the United States and, after the passage of the Endangered Species Act (ESA) in 1973, efforts to reintroduce and recover wolves began in earnest. Today gray wolves exist in three populations within the conterminous U.S.—in the western Great Lakes, northern

Rocky Mountains, and the Southwest (SW) regions, and throughout much of Alaska and Canada.

Importance of Attitudes toward Wolves

In April, 2009, the U.S. Fish and Wildlife Service (FWS) removed the northern Rocky Mountain population of gray wolves (*Canis lupus*) from protections under the ESA. In their assessment of threats to the wolf population, FWS noted that human hostility toward wolves led to their initial extirpation in the region and, because of the impact that social attitudes have on wolf recovery, FWS would require "…adequate regulatory mechanisms…[to] balance negative attitudes…in places necessary for recovery" (74 Fed. Reg., p. 15,175). The FWS' analysis highlights the need for up-to-date research on attitudes toward wolves to address a number of unanswered questions: Are North Americans' attitudes toward wolves changing? If so, what factors drive such change? How many wolves will local residents tolerate? The answers to such questions will ultimately shape the restoration and management of wolves in the U.S. for decades to come.

Monitoring social attitudes toward wolves is important for a number of reasons. At the individual level, a host of studies have demonstrated that attitudes are strong predictors of behavior (see Eagly & Chaiken, 1993). Consistent with this research, attitudes toward wolves and wolf restoration are strongly correlated with individual's willingness to pay and vote for wolf restoration (Wilson & Bruskotter, 2009). In addition, attitudes toward wolves have been shown to influence people's support for specific predator management policies and practices (Decker, Jacobson, & Brown, 2006; Bruskotter, Vaske, & Schmidt, 2009). The influence of attitudes was evident in efforts to reintroduce wolves into the Yellowstone National Park and central Idaho, where local opposition delayed reintroductions for more than a decade after they were initially recommended (Bangs & Fritts, 1996), and some wolf opponents went so far as to

characterize wolves as the "Saddam Hussein" of the animal kingdom (Paystrup, 1993).

Hyperbole aside, recent research suggests large carnivore recovery is possible even where human densities are relatively high, so long as management policies remain favorable (Linnell, Swenson, & Andersen, 2001). Yet, as wolf populations in the U.S. rebound through legal protections and recovery efforts, local resistance seems likely to increase (Kellert, 1985; Ericsson & Heberlein, 2003). Thus, sustained wolf recovery will depend, in part, upon public support and, as with monitoring of wildlife populations, the information gained via the monitoring of social attitudes will be critical for adapting management policies and practices in order to ensure the long term success of recovery efforts (Bruskotter, Toman, Enzler, & Schmidt, *in Press*).

Research on Attitudes toward Wolves

In general, research indicates that experience with wolves and proximity to wolf territories correlate negatively with attitudes toward the predator. For example, Ericsson & Heberlein (2003) found that Swedes who live in areas where wolves have been restored have more negative attitudes than the general public. Similarly, Karlsson & Sjostrom (2007) found that favorable attitudes toward wolf conservation were positively associated with distance to the nearest wolf territory. Heberlein and Ericsson (2008) suggested that an initial lack of experience with wolves may be more important for changing attitudes than experience itself. In a meta-analysis of more than thirty attitude studies Williams, Ericsson, & Heberlein, (2002) found that almost one-third of respondents reported no strong attitudes toward wolves. They suggested that one negative event (whether direct or indirect) could substantially impact these individuals' attitudes—particularly for those living in states with new or recovering wolf populations (Williams et al., 2002; Heberlein & Ericsson, 2008).

There also appears to be a difference in attitudes toward wolves in regions with long-standing populations of wolves versus those with newer populations of wolves. In one early study, Kellert (1985) found that out of all regions of the country Alaskans actually held the most favorable attitudes toward wolves, and Kellert (1999) found evidence for a slight increase in "affection for and interest in wolves" in Minnesota from 1985 to 1999 (though he also noted an increase in support for controlling wolf damage to livestock). Wolves have existed continuously in Alaska, Canada, and Minnesota despite their near extirpation in the lower 48 states, and currently, number in the tens of thousands (Defenders of Wildlife, 2009). Similarly, Zimmerman (2001) found that while the proportion of people holding negative attitudes toward large carnivores initially increased with their arrival, it decreased over time.

Longitudinal studies, though relatively few, generally show stability or increases in positive attitudes toward wolves among the general public (Williams et al., 2002; Ericsson & Heberlein, 2003; Bruskotter, Schmidt, & Teel, 2007). However, groups that anticipate negative impacts (e.g. livestock producers, big game hunters) have exhibited increased negative attitudes and support for more aggressive control of wolf populations (Kellert, 1999; Enck & Brown, 2002; Ericsson & Heberlein, 2003).

While previous studies on attitudes toward wolves have increased our understanding of the factors associated with attitudes, their usefulness is limited because they often (a) lack standardized, consistent forms of measurement, (b) focus on relatively small geographic units (i.e. states), and (c) employ cross-sectional/single time-point designs. Consequently, while we know a lot about factors associated with attitudes toward wolves, we have little knowledge about if and how attitudes toward wolves vary across regions or change over time (Williams et al., 2002; Bruskotter et al., 2007). These information gaps are particularly relevant given the recent

removal of wolves in the northern Rockies from the federal list of endangered species based largely on the assertion that attitudes toward wolves have become more positive in recent decades (see Bruskotter, Toman, Enzler, & Schmidt, 2010; Bruskotter et al., *in Press*).

Research Questions and Hypotheses

The primary objectives of this study were to: (a) describe social attitudes toward wolves in North America as indicated by attitudinal expressions about wolves in the news media, (b) determine if attitudinal expressions changed over a 10-year time period, and (c) determine whether exposure to wolves, as measured by region of news publication, affects the number and direction (positive or negative) of attitudinal expressions toward wolves in the news media.

The literature on perceived risk provided a useful "lens" for formulating hypotheses about how and why attitudes toward wolves change. Previous studies indicate that greater risk is associated with more negative attitudes toward an object (Sjoberg, 2000). In particular, three factors- *dread*, the *voluntariness of the exposure*, and *degree of familiarity*, may affect the degree of risk people are willing to accept (Slovic, 1992; Sjoberg, 2000). In this study, we expected low familiarity and the fear (or dread) associated with wolves to heighten risk attitudes among people living in states where wolf populations were likely to become reestablished (i.e., federal recovery zones) and among people living in states where wolf populations were relatively new (i.e., populations established after the passage of the ESA). Accordingly, we formulated the following hypotheses:

> H1[a,b]: Stories originating in states with new wolf populations (i.e. those established since the passage of the ESA) will contain a greater number of negative attitude expressions than stories originating in states with (a) no wolf populations and (b) states with permanent wolf populations.

H2: Stories originating in states in federal recovery zones—where wolf populations are not present—will contain a greater number of negative attitude expressions than stories originating in states outside of recovery areas.

H3: Because (a) wolves occupy relatively few of the U.S. states, (b) their distribution has been generally constant over the period of interest and (c) research suggests attitudes have remained relatively stable in recent decades (see Williams et al., 2002; Bruskotter et al., 2007), we expected the direction of attitude expressions to remain relatively constant over the period of interest. Specifically, we hypothesized that the trend in the percentage of paragraphs that were scored negatively in each year would not be significant.

Methods

Individuals' attitudes are generally measured via the use of a standardized set of questions designed to elicit opinions about, or affective reactions toward, a subject of interest (Nunally & Bernstein, 1994). The terms "public" or "social" attitudes are used to describe these attitudes in aggregate—as in public attitudes or public opinion. Content analysis of news media has emerged as an alternative method for studying public attitudes. Content analyses demand far less resources, in terms of time and funding, than longitudinal surveys or focus groups, and yet can provide comparable data. Moreover, content analysis may be the only viable alternative for addressing longitudinal research questions when prior data do not exist. Content analyses have become increasingly common in the field of natural resources and have been used to analyze a variety of topics, including national forest benefits and values (Bengston et al., 1999), public discourse about urban sprawl (Bengston et al., 2005), and conflict over natural resource management (Bengston & Fan, 1999). In this study, computer content analysis was used to measure attitudinal expressions about wolves in the United States and Canadian print news

media.

Rationale for Analyzing News Media

The media plays a role in both shaping and reflecting public opinion on a wide variety of social issues (Bengston, Potts, Fan, & Goetz, 2005). For example, numerous studies indicate that the media plays an "agenda-setting" role in mobilizing public concern for environmental issues (Ader, 1995; Brosius & Kepplinger, 1990; Kepplinger & Roth, 1979; Parlour & Schatzow, 1978). By presenting coverage of a topic in the media, and by keeping this issue "alive" for some extended period of time, the media transmits a subtle message concerning the legitimacy of the issue to the public (Salwen, 1988). Yet, public opinion can also affect media coverage. For example, Brosius & Kepplinger (1990) found that—at least with certain issues—problem awareness actually preceded media coverage. Perhaps most relevant for this study, content analyses of the news media have been shown to produce results that parallel the findings of attitude surveys and public opinion polls across a wide range of issues (e.g. Keppliger & Roth, 1979, Fan, 1997).

We reasoned that the media, by serving as a direct forum for public debate on wolves through editorials and letters to the editor and by reporting on debates which occur in other forums (i.e. courts, legislatures, protests and confrontations, and meetings and hearings) provides a reflection of the national debate on wolves (see Bengston, Fan, & Celarier, 1999). Our primary interest in this study was in making comparisons across regions and over time. Thus, our primary concern was with finding a reliable (i.e. consistent) method of assessing attitudes that would facilitate regional and longitudinal comparisons. Because survey data did not exist for most of the states/regions of interest and, where survey data did exist, sampling and measurement procedures often differed, content analysis presented the most cost-effective alternative.

Content Analysis Methodology

Computer content analyses utilizing the InfoTrend © software involves four steps: (1) downloading electronically-available news media stories regarding the topic or issue of study, (2) developing a conceptual framework for categorization of the ideas to be analyzed, (3) developing computer coding instructions to score the paragraphs for the identified conceptual statements and (4) assessing the validity and reliability of the analysis. Each of these steps is discussed, in turn, below.

Downloading news media stories. Data for this analysis consisted of all electronically-available U.S. and Canadian print news media stories about wolves published between January 1, 1999 and December 31, 2008 in the LexisNexis Academic database. We chose LexisNexis to maximize the breadth of publication coverage (Bengston et al., 2005). In order to reduce bias that could potentially result from newspapers being either added to or dropped from the LexisNexis database over the 10-year period, we included only those news sources that were continuously publishing over the entire time period. Within LexisNexis, 147 US and Canadian sources were available during the time period of 1999 to 2008. We then developed a search command that was designed to include as many target stories as possible, while excluding articles that did not concern wolves or wolf management (e.g. stories about well-known people with the last name, Wolf). In total, we found 7,437 stories, 4,559 from newspapers and 2,878 from newswires.

Developing a conceptual framework. We developed a classification system that identified three categories of evaluative statements or attitude expressions. Our goal was to "capture" any evaluative statement that concerned wolves or wolf management. We coded for three parallel psychological constructs often studied in the human dimensions literature: beliefs, attitudes, and norms/judgments. A *belief* represents something an individual holds as true or factual about

wolves. Beliefs are not necessarily evaluative in nature (e.g. wolves are long-legged); however, we chose to code only for beliefs that had clear evaluative meaning (for example, "wolves decimate deer," or "wolves are endangered"). Thus, the types of statements we chose to code for are quite similar to those employed in standard Likert-style measures of attitudes toward wolves (Likert, 1932). Similar to norms, we defined *judgments* as prescriptive statements about how wolves should be regarded, treated, or managed. Judgments included phrases such as "obligation to bring [wolves] back," "should allow ranchers to kill wolves" or "supportive of the wolf's return." Finally, we coded for *attitudes*, which included only statements that directly evaluated wolves (e.g. "wolves are beautiful," or "wolves are killing machines"). For the sake of simplicity, we use the phrase "attitude expressions" to encompass all three of these categories. In total, we coded for 10 different concepts each of which fell under one of these broad categories (Figure 1).

Developing computer coding instructions. Computer instructions were developed to score paragraphs that contained concepts of interest. Scoring was done with InfoTrend© software using the Filtscor computer language. The Filtscor language has two components, lexicons and idea transition rules. A lexicon is a word dictionary or series of word dictionaries, and was developed to include all of the important ideas and concepts which appeared in the text about wolves. Idea transition rules specify how words and phrases in the lexicon can be combined to create new meanings (Bengston et al., 2005). The lexicon and idea transition rules worked together to produce concept scores for paragraphs within the newspaper articles. For example, when the word "should" appeared within 50 characters ahead of the word "protect", the paragraph was scored as an instance of the concept, *wolves should be protected*. The coding scheme was developed via an iterative process that involved continuous testing and modification

of lexicons and idea transition rules by applying them to random samples of text. In analyzing text, the software treats each story as a case and counts the number of paragraphs that contain each conceptual category of interest. Multiple expressions of the same concept that appeared within the same paragraph are counted as a single expression.

Constructs of Interest	Concept Coded (Valence)	Examples
Attitudes toward wolves *Direct evaluations of wolves*	Wolves are bad, detrimental (-)	Wolves are bad; evil; vicious; harmful; killing machines
	Wolves are good, beneficial (+)	Wolves good; beautiful; gentle; wise; intelligent
Beliefs about wolves *Assertions of fact about what wolves do*	Wolves negatively impact ecosystems (-)	Wolves decimate deer/elk, surplus kill, overkill
	Wolves benefit ecosystems (+)	Wolves restore nature's balance; return missing component of wilderness; cull the weak, old
	Wolves are overabundant (-)	Wolves are not endangered, threatened, imperiled; too many
	Wolves are endangered (+)	Wolves are endangered, threatened, imperiled, rare; too few
	Wolves negatively impact human activities (-)	Wolves kill livestock, pets; pose threat to humans, children
	Wolves positively impact human activities (+)	Wolves increase tourism; enjoyable to see; part of natural heritage
Judgments *Prescriptive statements about wolves or wolf management*	Wolves should be killed, controlled (-)	Wolves should be killed, controlled, managed; wolves should not be reintroduced, protected
	Wolves should be protected (+)	Wolves should be restored, reintroduced, protected; wolves should not be killed, controlled, managed

Figure 1: Conceptual map of constructs and conceptual categories (i.e. attitudes) coded in this analysis.

Assessing Validity and Reliability

Validity, in computer content analysis, represents the degree to which the computer coding rules produce a score that is consistent with the evaluation of the coder. Seventy, randomly-selected stories were read and hand scored and results were compared with the computer coding results. Accuracy rates above 80 percent are generally considered acceptable

for content analyses (Krippendorff, 2003). After final refinements in the computer instructions, the accuracy rate for our coding rules was 89 percent. Inter-coder reliability, though a common concern in human coded content analyses, is not an issue in computer coded analyses, as the software applies the coding rules consistently across all analyzed text.

Measurement of region and statistical analyses

We assigned regional and recovery zone variables based upon the city and state/province of publication for each story (see Table 1). Exposure to (or experience with) wolves was also assessed at the state level. Thus, a story originating from a state with wolves was assumed to represent the views of people who had either directly or indirectly (e.g. via policy changes, conversations with peers, etc.) experienced wolves. Large newspapers—such as the *New York Times* and newswires—that serve national constituencies were separated from their state of publication and analyzed separately so as not to bias regional estimates. We then used one-way analysis of variance (ANOVA) to test for differences in attitude expressions between regions with different levels of exposure to wolves. Data were aggregated across study years, and the number of expressions per article used as the dependent variable. We used Tukey's b post-hoc comparisons to test for differences in the number of expressions across all groups. Finally, we used linear regression to determine if attitude expressions changed in the news media. We first calculated the percentage of total scored paragraphs that each conceptual category accounted for each year. Using percentages instead of frequencies (i.e. number of paragraphs coded as x) allowed us to account for high year-to-year variability in the volume of news stories. We fit a line through the resulting 10 data points for each conceptual category. The significance and direction of the slope of each line provided a convenient method for summarizing trends and testing hypothesis 3 (i.e., no significant change in expressions over time). All data were analyzed

using SPSS version 17.0.

Table 1. State classifications for experience and recovery zone variables.

Variable	States or provinces included in analysis[a]
Experience with wolves	
States/provinces with permanent wolf populations[b]	Alaska, Alberta, British Columbia, Minnesota, Ontario, Quebec
States with new wolf populations[c]	Arizona, Idaho, Montana, New Mexico, North Carolina, Wisconsin, Wyoming,
States in recovery zones that lack viable wolf populations	Illinois, Indiana, Iowa, North Dakota, Ohio, Oregon, Utah, Texas, Washington,
States/provinces without wolves	New Brunswick, Remaining US states
U.S national newspapers/wires	

[a] States that were missing from the analysis due to a lack of newspaper sources were Connecticut, Delaware, Hawaii, Kansas, Kentucky, Michigan, Mississippi, Montana, South Dakota and Vermont; Canadian provinces include Manitoba, Northwest Territories, Nova Scotia, Saskatchewan, and Yukon.

[b] Canadian national newspapers were included in this group due to the presence of permanent wolf populations throughout the vast majority of Canada

[c] New wolf populations were defined as populations that had been established after the passage of the Endangered Species Act of 1973.

Results

The final database of United States and Canadian news stories included 6,144 relevant articles. The volume of stories across the period was not constant, with peaks in coverage occurring in 1999, 2000, and 2008 and with decreasing coverage during 2001- 2003 (Figure 2). We surmised that the precipitous decline in the number of stories about wolves was likely due to the events of 11 September, 2001 and subsequent military actions in Afghanistan and Iraq. In total, we coded 29,989 evaluative expressions. Aggregating the data into positive and negative expressions provides a convenient method for summarizing the valence of the discourse surrounding wolves in North America. Aggregated results indicate that roughly 72 percent

(21,518) of all expressions were negative, while 28 percent (8,471) were positive over the ten year time period (Figure 2).

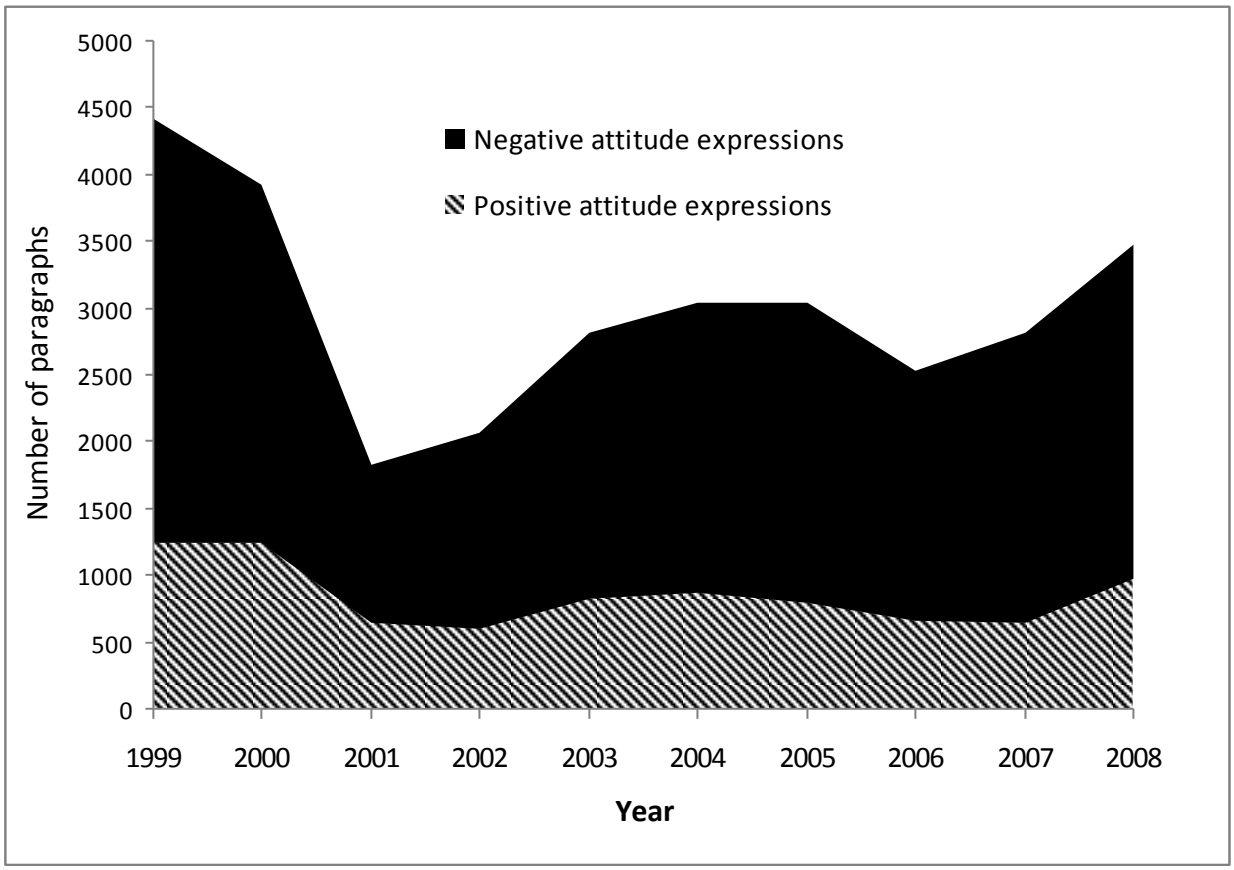

Figure 2: Positive and negative expressions (paragraphs) coded by year of publication, 1999-2008.

Describing the Debate about Wolves in North America

Negative expressions. The belief that *wolves negatively impact human activities* (30.5%) and the judgment that *wolves should be killed or controlled* (27.9%) together accounted for the majority of all expressions over the 10-year time period. The notion that *wolves were overabundant* (9.7%) and that *wolves negatively impact ecosystems* (2.3%) were cited less frequently, while overtly negative attitude expressions (e.g. *wolves are bad*) accounted for only 1.2% of all expressions.

Positive expressions. The judgment that *wolves should be protected* was the most frequently expressed positive evaluation, accounting for 14.9% of all expressions. Other positive expressions included the belief that *wolves are endangered* (7%), the belief that *wolves positively impact ecosystems* (2.3%), the attitude that *wolves are good* (2.1%), and the belief that *wolves positively impact human activities* (2%).

Table 2. Linear regression results for time trends in attitude expressions.

Concept	R^2	t (df=1)	B	Sig.
Positive Evaluations[a]				
Wolves are good, beneficial	.22	-1.51	-.10	.17
Wolves benefit ecosystems	.08	-.84	-.07	.43
Wolves are endangered	.06	.74	.09	.48
Wolves positively impact human activities	.62	-3.64	-.18*	.01
Wolves should be protected	.42	-2.39	-.45*	.04
Negative Evaluations[a]				
Wolves are bad, detrimental	.04	.57	.02	.59
Wolves negatively impact ecosystems	.39	2.27	.17*	.05
Wolves are overabundant	.05	.66	.09	.53
Wolves negatively impact humans	.02	-.39	-.19	.71
Wolves should be killed, controlled	.30	1.83	.64	.10
Summary: Total % of negative expressions	*.44*	*2.50*	*.72**	*.04*

[a] Trends were determined by calculating the percentage of paragraphs per year accounted for by each concept, and fitting a line through the 10-year trend. Thus, B-values can be interpreted as percentage point change per year over the 10-year time frame.
* $p < .05$

Trends in Attitude Expressions: Are Attitudes Toward Wolves Changing?

Three of ten conceptual categories of interest exhibited significant ($p < .05$) trends over the 10-year period of interest (Table 2). Relative to the total number of expressions per year, the belief that *wolves positively impact human activities* and the judgment that *wolves should be*

protected both decreased significantly from 1999 to 2008, while the belief that *wolves negatively impact ecosystems* increased over this time period. To characterize the overall valence of the discourse over time, we aggregated data into positive and negative expressions across conceptual categories and determined the percentage of all expressions each year that were negative (Figure 3). Fitting a line through these data points indicated the debate about wolves became increasingly negative over the 10-year period. [figure 3 about here]

Exposure to Wolves

Analysis of Variance was used to test whether the number of positive and negative expressions per article differed by the geographical origin of newspaper stories. Four discrete groups were created to capture different populations' level of exposure to wolves: (a) states/provinces without wolves, (b) states without wolves in federal recovery zones, (c) states with new wolf populations, and (d) states/provinces with permanent wolf populations. In the first one-way ANOVA, the number of negative attitude expressions per story was the dependent variable. There was a significant main effect of exposure to wolves on the mean number of negative attitude expressions, (F (4, 6138) = 47.13, $p < .001$). News stories in states/provinces without wolves had the fewest negative attitude expressions (M= 2.31; Table 3), while newspaper stories in states with new wolf populations had the greatest number negative attitudes in newspaper articles (M= 4.27).

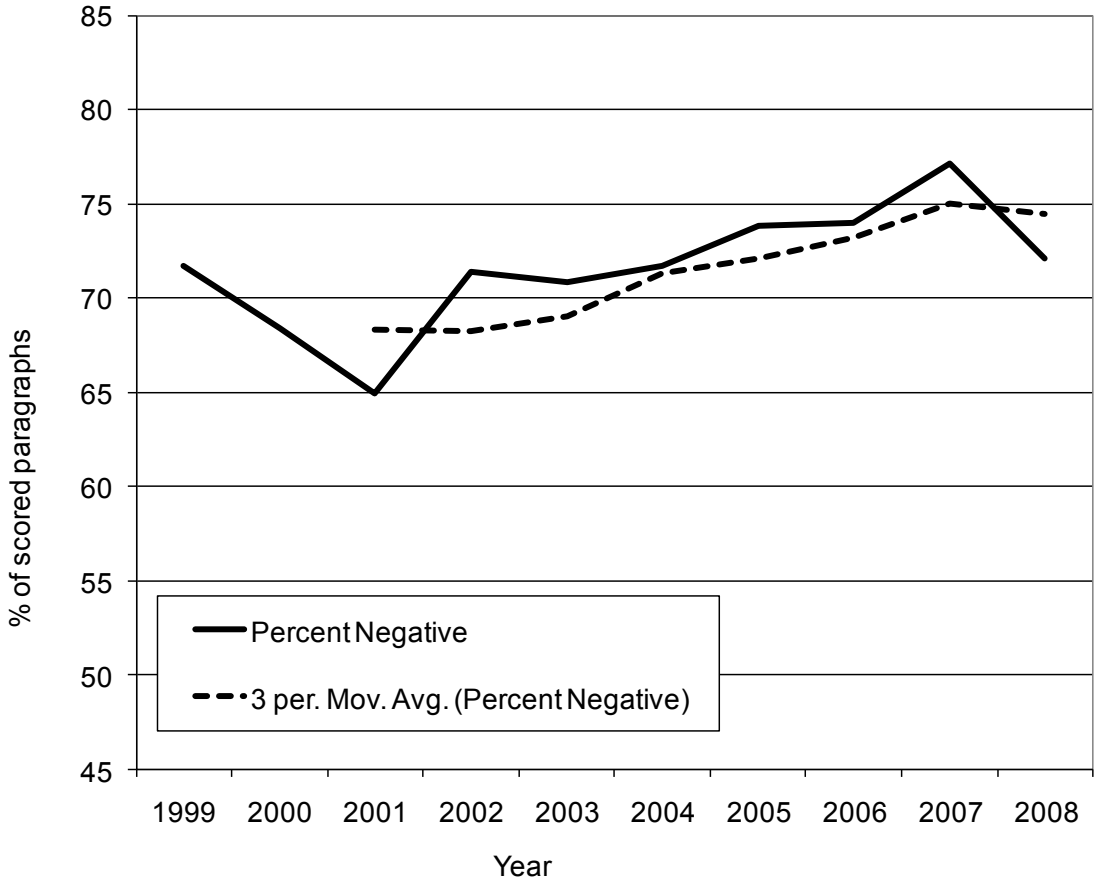

Figure 3: Percentage of negative expressions about wolves in the news media, 1999-2008.

Next, we conducted the same analysis using positive attitude expressions as the dependent variable. Again, there was a significant main effect of experience with wolves on the mean number of positive attitude expressions (F (4, 6138) = 14.44, $p < .001$). States/provinces without wolves had the most positive attitude expressions (M=1.59, Table 3); however, this group was not significantly different from states with new wolf populations or states in recovery zones. States/provinces without wolves did exhibit a significantly higher number of positive attitude expressions (M=1.59) than states/provinces with permanent wolf populations (M=1.37). National papers and newswires had the fewest positive expressions per story (M=1.22).

Table 3. Attitude expressions per article by region/experience with wolves.

Experience level (region)	N (stories)	Negative Expressions		Positive Expressions	
		Mean	SE	Mean	SE
States/provinces without wolves	858	2.31	0.09	1.59 [a]	0.06
States/provinces with permanent wolf populations	812	3.49 [a]	0.12	1.37 [bc]	0.05
States in recovery zones that lack viable wolf populations	868	3.52 [a]	0.11	1.48 [ab]	0.05
U.S. national newspapers/wires	2681	3.61 [a]	0.06	1.22 [c]	0.03
States with new wolf populations	924	4.27	0.12	1.54 [ab]	0.05

[a,b,c] Means that share a superscript do not differ significantly ($p > .05$) based on Tukey's b post-hoc test.

Discussion and Implications

The primary objectives of this study were to characterize attitudes toward wolves in North America as measured by attitudinal expressions about wolves in the news media, determine if these expressions have changed in the most recent decade and, determine whether exposure to wolves, as measured by region of news publication, affects the number and direction (positive or negative) of attitudinal expressions toward wolves in the news media. Our analysis indicates most of the discussion about wolves in the news media between 1999 and 2008 concerned wolves' impact on human activities and the question of whether wolves should be killed/controlled in order to reduce their "negative effects" on humans. Statements about the negative effects of wolves focused on the ideas that wolves kill and injure livestock, that wolves kill dogs and other pets, and that wolves pose a threat to human beings. Note, while the majority of the expressions we coded were negative, we caution that our results should not be interpreted as indicating that attitudes toward wolves in North America are negative. Such a result would conflict with nearly all prior attitudinal studies, a number of which overlapped with the time

period of interest for this study. Rather, our data indicate discourse about wolves in the news media became increasingly negative; to the extent that the news media reflects public opinion, the media's increasing focus on the negative impacts or risks associated with wolves suggests attitudes could follow a similar pattern.

Results supported three of the four hypotheses tested in this study. Specifically, stories originating in states with new wolf populations contained a greater number of negative expressions than stories originating in states with no wolves (H1a) and states with permanent wolf populations (H1b), and stories originating in states in federal recovery zones where wolves were not yet present contained a greater number of negative expressions than stories originating in states outside of federal recovery areas where wolves were not present (H2). However, in contrast with hypothesis 3, negative attitude expressions increased significantly over the time period of interest.

In support of research that suggests even indirect experience with wolves can lead to more negative attitudes (Karlsson & Sjostrom, 2007), our analyses found increased negative discourse surrounding the predator in areas with relatively new wolf populations; however, discourse in these states did not differ from states without wolves that were in federal recovery zones—suggesting merely the threat associated with newly established wolf populations may be all that is required to negatively impact public opinion. This result is consistent with research by Enck and Brown (2002) and Duda (1998), who found attitudes toward wolf restoration decreased substantially in the Adirondacks following negative media coverage concerning the proposed reintroduction, despite a lack of wolves in this area. Contrasting with Enck and Brown (2002) and Duda (1998), Bruskotter et al. (2007) found no significant differences between Utah residents' attitudes toward wolves over a roughly 10-year time period. However, while both

states lacked wolf populations during the study time period, wolf reintroduction was being planned and publicly debated in the Adirondacks, whereas no reintroductions had been planned for Utah—nor was the state part of any federal recovery zone at the time of the survey. Our results help shed some light on these disparate findings. Specifically, our data suggest that, even absent wolves, the anticipated presence of wolf populations can increase negative discourse about the predator, which in turn, could promote changes in attitudes—especially among people with little knowledge or experience with wolves (see Williams et al., 2002 for discussion). Similarly, residents living in areas where wolves are newly established are likely to have a low degree of familiarity, which could heighten their risk perception. Indeed, as hypothesized, the number of negative expressions per article was significantly higher for states with new wolf populations as compared with those with no wolves, or with permanent wolf populations.

As familiarity with wolves builds, we expect that fear of wolves—and the risks associated with wolves—will eventually level off and decrease—especially if conflicts with wolves remain relatively low (see Zimmerman et al., 2001). Our data support this conclusion, as states and provinces with permanent wolf populations exhibited less negative discourse, despite having much higher wolf populations. In addition to familiarity, it is possible that the removal of wolves from federal endangered species protections could increase residents' perceived control over the risks associated with wolves, which could decrease opposition over time. Alternatively, attitudes toward wolves could be rooted in more deeply held values (at least among some individuals). If opposition to wolves is value-based, we should expect little change in attitudes to occur over the short term regardless of risk perceptions (Rokeach, 1973; Fulton et al., 1996). Additional research is needed in order to determine the extent to which opposition to wolves is rooted in risk attitudes, as opposed to more fundamental values.

The handful of longitudinal studies that have examined attitudes toward wolves paint an increasingly complex picture, with few consistent findings. In this study we used content analysis to examine trends in attitudes, and formulated hypotheses based upon psychological theories about risk. In an early use of content analysis to study attitudes toward animals, Kellert and Westervelt (1982, p. 28) concluded that while "[h]istorical studies are necessarily fraught with uncertainty... the need to understand the past in attempting to avoid previous mistakes when planning for an uncertain future rationalizes the effort". Indeed, while the methods employed in this study are most useful for characterizing the focus of the debate about wolves and how this debate has changed over time, they are limited in that they provide no information about the attitudes and behaviors of individuals, nor are we able to characterize the attitudes of particular groups of stakeholders. Still, content analysis provides a useful alternative methodology for studying public attitudes over time and across regions, particularly when longitudinal survey data are unavailable, as in this case. However, we stress the need for longitudinal survey research in order to better understand the factors that drive attitude change over time.

Management Implications

This research is particularly timely given the Fish and Wildlife Service's decision in April of 2009 to delist gray wolves in the northern Rocky Mountains region. In support of their decision, FWS concluded that attitudes toward wolves had improved dramatically and wolves were no longer threatened by low human tolerance. Yet, FWS based this assertion on little consideration of the relevant social science research data (Bruskotter et al., 2010; Bruskotter et al., *in Press*). In fact, the only quantitative study they cited specifically admonished wildlife professionals for assuming that positive attitudes toward wolves were increasing (Williams et al., 2002). Our results provide additional quantitative evidence that this assumption is likely

inaccurate and misleading for wildlife managers and policy-makers. Specifically, our findings suggest that attitudes may actually be increasingly negative toward wolves—at least in regions with new wolf populations and in recovery zone regions where the public has little familiarity with the species. Notably, a previous attempt to reintroduce wolves into Michigan's Upper Peninsula in the 1970s failed largely because of human-induced mortality (Kellert, 1996). Deeply ingrained anti-predator and anti-government attitudes were identified as significant reasons for the failure of this reintroduction (Hook & Robinson, 1982). By relying upon assumptions about attitudes toward wolves—as opposed to empirical research—wildlife management agencies run the risk of prematurely lifting protections and repeating such mistakes.

Linnell et al. (2001) have demonstrated that large carnivore populations can be maintained, even in areas with high human densities—so long as management remains favorable. To the extent that carnivore policy is driven by the policy preferences of relevant publics, the success of large carnivores, and the extent of their recovery in the U.S. could ultimately depend upon human tolerance. Our results provide more evidence that the assumption that attitudes toward wolves are becoming more positive or protectionist is untenable. This view is overly simplistic, as it does not account for exposure/experience with wolves, nor the varied attitudes of interested stakeholders across the US.

Over the short term, our data suggest that attitudes in areas where wolf populations are new and recovering may become more negative as people begin to gain experience with wolves. Wolves may need increased protection and/or monitoring in these regions for a time while people adapt. However, our data also suggest that negative media attention and the heightened perceptions of risk should be reduced over time, as people learn once again how to live with wolves.

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