Human Dimensions of Wildlife

Attitudes to Wolves and Wolf Policy Among Ojibwe Tribal Members and Non-tribal Residents of Wisconsin's Wolf Range

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*Gray wolf (*Canis lupus*) policy is dynamic and involves multiple stakeholders. Attitudinal surveys have historically measured stakeholder attitudes, although Native American views have rarely been studied systematically. We sent a mail-back questionnaire to members of the Bad River Band of the Lake Superior Tribe of Chippewa Indians (Ojibwe) to assess attitudes toward wolves and Wisconsin wolf policy. We compared their responses to a sample of non-tribal residents of Wisconsin's wolf range. Tribal respondents held significantly more positive attitudes toward wolves, were more supportive of protective policy, and were less supportive of a public wolf harvest than non-tribal respondents. Multivariate analyses revealed several demographic factors associated with observed differences in attitudes; the most frequent and strongest predictor was whether or not a respondent was a tribal member. Ojibwe perspectives deserve attention in future wolf policy and may influence a possible wolf harvest, especially given Ojibwe treaty rights in the Great Lakes region.*

Keywords carnivore management, stakeholder opinion, treaty rights, survey, Native Americans

Introduction

Human attitudes, beliefs, and cultural credos favor or undermine the existence of many wild animals (Bright & Manfredo, 1996; Kaltenborn & Bjerke, 2002; Kaltenborn, Bjerke, & Strumse, 1998; Kellert, Black, Rush, & Bath, 1996). Wolves in particular have stirred strong human emotions ranging from admiration to hatred and vary markedly by individual, country, culture, and era (Jhala & Giles Jr., 2005; Kellert, 1985; Lopez, 1978; Musiani & Paquet, 2004). Anthropologists and historians have documented a uniquely spiritual and mutualistic orientation to wolves among Native Americans (Lopez, 1978),

but this distinct perspective has seldom been quantified. Because the behavior of the public directly affects carnivore populations (Woodroffe & Ginsberg, 1998), recognizing and addressing public concerns can lead to more successful management interventions (Nie, 2003; Treves, Wallace, Naughton-Treves, & Morales, 2006).

We investigated attitudes toward wolves and wolf policy among the Bad River Band of the Lake Superior Tribe of Chippewa Indians (Ojibwe) in northern Wisconsin. The Ojibwe have a profound cultural and historical relationship with the wolf dating back to their origin story (Benton-Banai, 1979; David, 2009; Johnston, 1990). In an Ojibwe creation story retold by Benton-Banai (1979) human was the last creature to be put on earth and was placed there alone, unlike the other animals that were brought in pairs. "Original Man" asked the Creator for a partner and the Creator provided him not a woman, but a brother— a wolf. The Creator told the pair they were to walk through the world together. When the journey was over, the man and the wolf were forced to part, but the Creator told them that they would be forever linked saying, "What shall happen to one of you shall also happen to the other. Each of you will be feared, respected, and misunderstood by the people who will later join you on this earth" (Benton-Banai, 1979, p. 8). The Ojibwe of the Great Lakes region also possess off-reservation treaty rights in the ceded territories that include most of the northern two-thirds of Wisconsin and overlap much of wolf territory (Satz, 1991). These treaty rights affirm the tribes' claim to half of any harvest (excluding timber) within the ceded territories, which would include wolves (Satz, 1991; Wydeven, Van Deelen, & Heske, 2009). In short, the Ojibwe could play a pivotal role in Great Lakes wolf policy, particularly in Wisconsin.

Whereas Native American tribes such as the Nez Perce in the western United States have been highly involved in wolf recovery and policy (Bangs & Shivik, 2001; P. Wilson, 1999), Native American tribes in Wisconsin have not participated as thoroughly or as publicly in wolf recovery and policy creation (David, 2009). There are two designated avenues for transmitting information between the U.S. government and the tribes on the specific issue of wolf policy in the Great Lakes region. The Great Lakes Indian Fish and Wildlife Commission (GLIFWC) is represented on Wisconsin's wolf science committee and the Voigt Intertribal Task Force offers another means of voicing tribal opinion (David, 2009). In 2010 the Voigt Intertribal Task Force formally opposed a public wolf harvest (David, 2009; Peter David, GLIFWC pers. comm. 2/10). This position suggests a unique Ojibwe perspective given the majority of northern Wisconsin's non-tribal residents support a public hunt (Treves & Martin, 2011). Previous attitudinal research on wolves in the Great Lakes region reveals little of this disparity (Schanning, 2009). The perspectives and opinions of tribal members have not been systematically assessed. We offer results of a mail-back questionnaire survey supplemented by Ojibwe feedback from a public meeting. We do not claim to capture the opinions of all Ojibwe bands, much less of all Native Americans. Our aim is to shed light on tribal member opinion regarding wolves and wolf policy, in part by comparing their attitudes to a sample of non-tribal citizens residing in the same region.

Background

Extirpated from Wisconsin by 1960, the gray wolf (*Canis lupus*) has since increased to over 700 individuals in winter 2009–2010 without direct human intervention other than protection under the Endangered Species Act (Wydeven & Wiedenhoeft, 2010). As Wisconsin's wolf population has grown, so have their conflicts with humans including increased wolf attacks on livestock and hunting dogs (Treves et al., 2002). When human livelihoods and

recreation are threatened, people worldwide have killed wolves in retaliation (Gazzola, Capitani, Mattioli, & Apollonio, 2007; Kaczensky, Enkhsaikhan, Ganbaatar, & Walzer, 2008) and blamed wolves for unsuccessful deer hunts (DelGiudice, 2010). Much of Wisconsin's wolf policy has been focused on monitoring the wolf population, but considerable time and resources have been delegated to managing wolf attacks on livestock, domestic game, bear hunting dogs, and pets (depredations) (Ruid et al., 2009; Treves, 2008). Wolf policy is centered on balancing the diverse perspectives of livestock owners, rural residents, hunters, conservationists, Native American tribes, state and federal agencies, animal welfare organizations, conservationists, and concerned urban citizens for a deeply contentious species and controversial policies such as lethal control and compensation (Schanning, 2009; Treves, 2008). Open stakeholder meetings annually held by the Wisconsin Department of Natural Resources (WDNR) have provided avenues for hearing vocal stakeholders' positions in an effort to find common ground. Although time-intensive and politically fraught, collaboration promises publicly accepted and scientifically sound management (Clark, Mattson, Reading, & Miller, 2001; Nie, 2003; Treves, 2008).

Methods

From May–August 2009 we sent mail-back, self-administered questionnaires to 2,306 adult residents of Wisconsin's wolf range, defined as the northern third of the state and the Central Forest Area; WDNR zones 1 and 2 (Wydeven & Wiedenhoeft, 2009). Our 2009 samples included (a) past respondents to a 2004 wolf policy survey (see Treves, Jurewicz, Naughton-Treves, & Wilcove, 2009) who were originally drawn randomly from a commercial list of mailing addresses in three Wisconsin zip codes (Wausau, Butternut, and Owen), and (b) a random sample from the Bad River tribal member household list. The Bad River Natural Resources Department (BRNRD) made this list available on the condition of confidentiality. We stratified the Bad River sample by sex to match the 50:50 sex ratio found in the tribal member household list. The sample of non-tribal citizens (henceforth NT) was developed for a different study which looked at donors and non-donors to wolf damage compensation who donate through state income tax and specialty automobile license plate fees (see Treves et al., 2009). That sample contains a male bias probably due to heads of household being listed on the commercial mailing list and hence is not perfect. However the NT sample was the best available comparison to Bad River tribal members (henceforth BR) because the NT respondents were sampled at the same time, using the same survey instrument, administered in the same way, and drawn from the same region. We do not claim that the NT sample is representative of all non-tribal citizens of wolf range in Wisconsin, but instead that they provide an informative comparison with which to understand the BR sample.

Of the 1,667 survey packets we mailed to BR, only 841 reached the intended recipient. The postal service returned 826 (49.6%) as "undeliverable." We believe this high rate of undeliverables reflected in part that members had to update personal information voluntarily. Remote, rural post offices may have fewer resources and staff than more developed areas which might have compromised delivery and return. We received 376 completed BR surveys for a response rate of 45%. Of the 639 surveys we sent to NT, 45 (7.0%) were returned as "undeliverable," 83 (12.9%) were returned by a different person than the intended recipient, and 403 were returned correctly completed, for a response rate of 79% in our NT sample.

Our questionnaire measured (a) attitudes toward current and proposed wolf policy in Wisconsin including a possible public wolf harvest, (b) attitudes toward wolves, and (c)

individual experience with wolves, including depredation or other conflict. We also asked respondents for socioeconomic information.

We attempted to assess non-response bias by calling 100 randomly chosen BR non-respondents. Only a few telephone numbers were available on the member list so we located additional numbers using www.yellowpages.com. We were able to reach only 19 of the 100. Most of the 100 phone numbers were wrong numbers or were not answered despite several attempts over several days. Of these 19 people, nine refused to take the phone survey and 10 agreed. Of the latter 10, three reported that they had never received the survey (we verified that we had sent it to their current and correct address). While we only spoke to a small number of non-respondents (10), we found that some "non-responders" were actually undeliverable, having never received the questionnaire in the mail. Presumably some of our survey non-respondents that we also did not reach by phone were actually undeliverable as well. Therefore it is likely that our BR response rate was higher than 45%. During the phone survey we asked demographic information and key questions verbatim from the survey to detect non-response bias. Among the small sample of 10 non-responders reached by phone, we found no significant differences between non-responders and respondents in their demographics, tolerance for wolves, or their preferences for wolf policy (Shelley, 2010). We tested non-response bias differently for NT. For the questions used in this article, we assessed if the NT respondents differed significantly from the 2004 respondents who did not respond in 2009. No differences were detected for the questions presented here.

Because we found approximately 400 cases of item non-response (when a respondent left a question blank) with 119 missing from either income, education level, or age, we used deductive imputation to fill a subset of missing values in those three variables. Deductive imputation reduces the loss of data which is especially important in multivariate analyses that demand all respondents answer all questions or be discarded (Brick & Kalton, 1996; Schafer & Graham, 2002). Because of the strong correlation between "age" and "years lived in Wisconsin" (Pearson's $r = .73$, $n = 769$), we imputed one or the other from a linear regression of the two variables in a total of 11 cases. We used reported income levels to impute education levels and vice versa among 10% of respondents, although the correlation was weaker ($r = .42$, $n = 768$). Because the relationships between education and income levels were different for BR and NT (BR $\chi^2 = 38.31$, $df = 5$, $p < .001$; NT $\chi^2 = 76.28$, $df = 5$, $p < .001$), we used different predicted median values for each in a total of 73 cases. Predictive median matching imputation allowed us to keep respondents in the analysis for key response variables without strongly affecting correlations (Schafer & Graham, 2002). For a few cases, when a respondent left one question blank but answered others, we could sometimes deduce their intent with confidence because of redundancy in our questionnaire (e.g., we asked about hunting in nine questions so could discriminate hunters from non-hunters).

Using JMP 8® (SAS Corp.), we tested if medians and distributions differed between our two samples. Mood's median test returns a z-value. For categorical responses with >2 levels, we used Pearson's contingency test that returns a χ^2. For Pearson's contingency tests with two levels we report the p-value from the two-tailed Fisher's exact test. To compensate for running 43 statistical tests, we applied Bonferroni's correction for multiple comparisons and set significance at $p < .02$ for all tests. For conciseness and clarity, in the scale questions we combined "strongly agree" and "agree" responses into "agree," and "strongly disagree" and "disagree" responses into "disagree," but the tests used all 5 levels ($df = 4$). In the following figures and analyses, sample sizes varied because not all respondents answered all questions.

To understand the independent strengths of multiple sociodemographic predictors, we ran multivariate analyses of two kinds: (a) generalized linear models (GLM) and

(b) logistic regressions. Before either, we examined pairwise collinearity between continuous predictors and discarded the weaker of a pair exhibiting high collinearity ($|r| > .7$). For the two categorical response variables we ran four nominal logistic regressions, one for each answer option. For all models and regressions we included seven demographic predictors simultaneously: (a) HUNTER: hunter verses non-hunter, where "hunter" was defined as a respondent who reported having "hunted in the past two years" or "regularly hunted at any other time in [their] life," (b) SEX, (c) AGE, (d) LIVESTOCK: livestock as a major source of income, which included respondents who reported that currently or in the past "raising livestock is/was your household's major source of income," (e) INCOME: with five levels ranging from "less than \$20,000" to "more than \$80,000," (f) EDUCATION: with six levels ranging from "some high school" to "advanced degree," and (g) BR or NT as defined above. For continuous and ordinal response variables we used a normally distributed (identity link function) GLM for multivariate analysis of each response variable separately. We included certain predictors according to previous research in the area. As wolf populations have grown in the Great Lakes region since the 1970s, there has been a wealth of attitudinal surveys conducted concerning wolves in the area (for review of 16 studies see Schanning, 2009). Survey research across this region in the 1980s revealed that fear of wolves, age, education level, participation in hunting, and growing up in rural areas were significant predictors of people's attitudes toward wolves (Hook & Robinson, 1982; Knight, 1985). Surveys from Wisconsin, Michigan, and Minnesota since the 1990s have shown general support for wolf conservation (M. Wilson, 1999) but also strong support for the management of negative impacts of wolves on humans via support for compensation programs, lethal control of depredating wolves, and moderate utilitarian views (Beyer et al., 2006; Naughton-Treves, Grossberg, & Treves, 2003; Schanning, 2003, 2004, 2005; Treves et al., 2009; Williams, Ericsson, & Heberlein, 2002).

To determine which models fit best for each response variable, we used the corrected Akaike Information Criterion (AIC$_c$) with backwards stepwise removal of weak predictors (Mazerolle, 2006). According to the AIC$_c$ values the best fit for all response variables was the saturated model (all seven predictors) except in one case. The exception was "I think wolves are essential to maintaining the balance of nature" for which the best model had six predictors excluding SEX (Table 1). Although in this case the best model was not the saturated model, we present results from the saturated model to show that sex, a known predictor of values toward nature (Kellert, 1997; Kellert & Berry, 1987), was statistically controlled. Given the male sex bias in our NT sample, we account for the possible affect of sex by including sex as a predictor in all multivariate tests.

On December 8, 2009 we held a community meeting on the Bad River reservation. The "Wolf Information Session" was in collaboration with the BRNRD and GLIFWC to present selected results from the survey, share information about wolf management on the Bad River reservation, and update people on current Wisconsin state and federal wolf policy. We hoped to add qualitative nuance to the survey results by listening to the participants' reflections and comments on those three topics. We structured the event as a dialogue and so invited and encouraged attendees to participate throughout (Shelley, 2010). Approximately 60 community members including a few children attended the meeting, which lasted two hours. For further details see Shelley (2010).

Results

The Bad River sample (BR) contained more women (Fisher's exact test $p < .001$), younger respondents (Median test $z = 9.15$, $p < .001$), more outdoor pet owners ($p = .008$), respondents reporting shorter median residence in Wisconsin ($z = -6.90$, $p < .001$) and lower

Table 1

Multivariate modeling of response variable "I think wolves are essential to maintaining the balance of nature"

I think wolves are essential to maintaining the balance of nature

Number of predictors	Negative log likelihood	K^a	N^b	AIC_c	Variable removed	ΔAIC^c	AIC weight[d]	%[e]	Sum AIC weight[f]
7	1106.306	8	743	2245.36	None	2.086	0.35234	0.2605	1.356
6	**1106.307**	**7**	**743**	**2243.27**	**SEX**	**0.00**	**1.00000**	**0.7395**	
5	1112.92	6	747	2254.41	AGE	11.14	0.00381	0.0028	
4	1127.548	5	755	2281.59	LIVESTOCK	38.31	5.0×10^{-9}	4.0×10^{-9}	
3	1142.707	4	760	2309.83	HUNTER	66.56	4.0×10^{-15}	3.0×10^{-15}	
2	1152.391	3	760	2320.97	INCOME	77.70	1.0×10^{-17}	1.0×10^{-17}	
1	1169.695	2	766	2345.42	EDUCATION	102.15	7.0×10^{-23}	5.0×10^{-23}	
0	1240.76	1	766	2485.53	NT or BR[g]	242.26	2.0×10^{-53}	2.0×10^{-53}	

The best model by Corrected Akaike's Information Criterion (AICc) is shown in bold.

[a] k = the number of predictors in the model plus 1 for the intercept (Mazerolle, 2006).

[b] The N changes for each model because not all questions were answered by all respondents. As the variables were removed, the number of respondents for whom there is a response for the remaining variables increased.

[c] ΔAIC is the measure of each model relative to the best model (Delta $AICi = \_i = AICi − minAIC$) (Mazerolle, 2006).

[d] The AIC weights represent the ratio of the delta AIC of a given model relative to the whole set of possible models ($\exp(\Delta i/2)/\sum_{r=1}^{R}\exp(-\Delta r/2)$) (Mazerolle, 2006).

[e] % is the AIC wieght divided by the sum AIC weight.

[f] is the sum of all the AIC weights.

[g] BR = Bad River tribal respondents; NT = non-tribal respondents.

incomes levels ($\chi^2 = 76.17$, $p < .001$) than the sample of non-tribal respondents (NT) (Table 2). Although both samples contained few current livestock producers, there was a higher percentage among NT ($\chi^2 = 56.14$, $p < .001$). A minority of both groups reported not owning or managing any animals ($p = .029$). Both groups had a high percentage of hunters, but NT had more respondents who reported having hunted in the past two years ($p = .001$) and more respondents who had hunted regularly any other time in their life ($p = .004$) (Table 2). In 2009, a majority of respondents in both samples were hunters by our liberal definition. These high proportions of hunters reflect several factors in addition to our definition of a hunter: possible disproportionate hunter interest in our topic, respondents' interpretations of "regularly," and the widespread tradition of hunting in the state. Hunting has long been an important feature of northern Wisconsin life (Heberlein, 2000). Studies of hunters' attitudes show variable attitudes to wolves but generally show them to be more experienced with wolves and less fearful (Kellert, 1985; Tucker & Pletscher, 1989; Williams et al., 2002).

In univariate tests, BR and NT differed significantly in attitudes toward wolves (Table 3) and preferences for wolf policy (Table 4). BR more often agreed (76%) with the statement "I think wolves are essential to maintaining the balance of nature" than did NT (39%) (Table 3). BR more often opposed a public wolf hunting or trapping season than NT; 39% of BR and 7% of NT chose "no, never" (Table 4). However the male bias in NT and other potentially confounding differences in sociodemographic characteristics between the two samples demand multivariate tests of the hypothesis that BR or NT was a predictor of different attitudes.

Table 2
Characteristics of Bad River tribal respondents and non-tribal respondents

Self-reported demographic data	Bad river tribal respondents	Non-tribal respondents
Number of respondents	376	403
SEX	45% female[a]	15% female
	55% male	85% male[b]
AGE (range)	18 to 91 years old	30 to 93 years old
Years lived in Wisconsin range	5 to 91	5 to 90
EDUCATION (report having a bachelor's degree or equivalent)	14%	18%
INCOME (report 2008 household income as less than $40,000)	68%	42%
LIVESTOCK (report owning livestock was NEVER a major source of income)	94%	75%
Report owning outdoor pets	57%	47%
Report they do NOT manage or own any animals	34%	42%
HUNTER		
(Report hunting regularly in the past)	65%	78%
(Report having hunted in the past two years)	46%	57%

[a]This sex ratio is consistent with the Bad River tribal member database ($\chi^2 = 1.91$, $df = 1$, $p = .17$).
[b]The male-bias reflected random selection of addresses from a commercial list which may bias respondents toward heads of households (Treves et al., 2009).

Table 3

Comparing Bad River tribal respondents and non-tribal respondents' attitudes to wolves

Survey question and response options	Respondents		Test of difference
	Bad River tribal respondents	Non-tribal respondents	Pearson's contingency tests[b]
I would be afraid if wolves lived near my home[a]	$n = 369$	$n = 396$	$\chi^2 = 30.1$ $p < .0001$
Agree	33%	44%	
Neutral	19%	21%	
Disagree	48%	35%	
I think wolves are essential to maintaining the balance of nature[a]	$n = 369$	$n = 397$	$\chi^2 = 135.4$ $p < .0001$
Agree	76%	39%	
Neutral	13%	24%	
Disagree	9%	35%	
If I were out hunting and saw a wolf I might shoot it[a]	$n = 368$	$n = 393$	$\chi^2 = 30.5$ $p < .0001$
Agree	8%	16%	
Neutral	15%	23%	
Disagree	77%	61%	
I think Wisconsin's growing wolf population threatens deer hunting opportunities[a]	$n = 370$	$n = 397$	$\chi^2 = 30.5$ $p < .0001$
Agree	26%	57%	
Neutral	20%	16%	
Disagree	54%	27%	

[a](Likert-scaled responses as per Kellert, 1985).
[b]$df = 4$ for each test.

HUNTER, LIVESTOCK, EDUCATION, and INCOME were significant in many of the Generalized Linear Models (GLM), but the most prevalent and most significant predictor in most multivariate models was BR or NT (Table 5). Of the four GLMs concerning attitudes towards wolves, BR or NT was the most significant predictor in three of the four models and was the second most significant in the fourth model. For example, BR or NT was the most significant predictor ($\chi^2 = 12.96$, $p = .0003$) of agreement with "I would be afraid if wolves lived near my home" where BR disagreed significantly more often than NT. For the same response variable, respondents reporting higher education levels were more likely to disagree than were those reporting lower education levels ($\chi^2 = 17.44$, $p = .004$).

For the response variable "I think Wisconsin's growing wolf population threatens deer hunting opportunities," BR or NT was the most significant predictor ($\chi^2 = 39.34$, $p < .001$). HUNTER was also a significant predictor ($\chi^2 = 22.78$, $p < .001$) with hunters being more likely to agree with this statement. Respondents reporting lower education levels were more likely to agree with this statement ($\chi^2 = 24.61$, $p = .0002$), while respondents reporting lower incomes were more likely to disagree with this statement

Table 4

Comparing Bad River tribal respondents and non-tribal respondents' preferences
for wolf policy

Survey question and response options	Respondents		Test of difference
	Bad River tribal respondents	Non-tribal respondents	Pearson's contingency tests[a]
Do you believe there should be a public hunting or trapping season on wolves?	$n = 371$	$n = 398$	$\chi^2 = 145.1$ $p < .0001$
Yes, Immediately	14%	40%	
Sustainable[b]	23%	33%	
Depredation[c]	24%	20%	
No, Never	39%	7%	
Wolves should be protected from hunting and lethal control because of their cultural significance	$n = 368$	$n = 399$	$\chi^2 = 182.1$ $p < .0001$
Agree	54%	14%	
Neutral	23%	22%	
Disagree	23%	64%	
[What should authorities do] if a wolf kills a family pet (e.g. dog or cat)?[d]	$n = 367$	$n = 394$	$\chi^2 = 73.184$ $p < .0001$
Monitor[e]	15%	7%	
Relocate[f]	42%	27%	
Deter[g]	14%	6%	
Kill[h]	29%	60%	
In your opinion, the wolf population in Wisconsin should be kept below:	$n = 358$	$n = 387$	$\chi^2 = 143.2$ $p < .0001$
No wolves	6%	18%	
100 wolves	11%	19%	
350 wolves	9%	24%	
540 wolves	7%	14%	
1,000 wolves	15%	10%	
No cap on population	52%	15%	

[a]$df = 4$ for each test.
[b]Yes, as soon as biologists think the wolf population can sustain annual harvests.
[c]Yes, but only when depredations become unmanageable.
[d]As per Manfredo, Zinn, Sikorowski, and Jones (1998).
[e]Authorities should take no immediate action toward the wolf, but monitor the situation.
[f]Authorities should capture and relocate the wolf to a wilderness area.
[g]Authorities should try to frighten the wolf away or deter it from approaching residential areas.
[h]Authorities should kill the wolf.

($\chi^2 = 18.63$, $p = .0009$). This result should be viewed with caution as 10% of our respondents did not provide income or education, leading us to impute their values from education to income or vice versa (see methods). The most significant predictor for the response variable "If I were out hunting and saw a wolf, I might shoot it" was LIVESTOCK ($\chi^2 = 17.12$,

Table 5
Generalized linear model results of attitudes to wolves and wolf policy

Response variable	Whole model test results incorporating 7 predictors[b]	Predictor "BR or NT[a]" parameter estimates			
		β coefficient (positive values indicate NT more likely to agree)	SE	χ^2	*p*-value
I think wolves are essential to maintaining the balance of nature[c]	$\chi^2 = 195.01$ $df = 14$ $p < .0001$	−.38	.05	59.52	<.0001
I would be afraid if wolves lived near my home[c]	$\chi^2 = 55.75$ $df = 14$ $p < .0001$	.21	.07	12.96	.0003
I think Wisconsin's growing wolf population threatens deer hunting opportunities[c]	$\chi^2 = 155.14$ $df = 14$ $p < .0001$	.36	.06	39.34	<.0001
If I were out hunting and saw a wolf I might shoot it[c]	$\chi^2 = 75.2$ $df = 14$ $p < .0001$	.14	.05	8.51	.0035
Wolves should be protected from hunting and lethal control because of their cultural significance	$\chi^2 = 286.39$ $df = 14$ $p < .0001$	−.57	.05	111.55	<.0001
In your opinion, the wolf population in Wisconsin should be kept below[d]	$\chi^2 = 169.85$ $df = 14$ $p < .0001$	−.58	.07	57.58	<.0001

[a]BR = Bad River tribal respondents; NT = non-tribal respondents.
[b]SEX, AGE, LIVESTOCK, HUNTER, INCOME, EDUCATION, NT or BR.
[c]Likert-scaled responses as per Kellert (1985).
[d]The answer options were: No wolves; 100 wolves; 350 wolves; 540 wolves;1,000 wolves or no cap on population.

$p < .001$); respondents reporting that livestock was not a major source of income were significantly more likely to disagree. BR or NT was also a significant predictor ($\chi^2 = 8.51$, $p = .004$) (Table 5).

As with the GLMs for attitudes toward wolves, the GLMs for wolf policy show that, HUNTER, LIVESTOCK, EDUCATION, and INCOME were less significant than BR or NT as a predictor. For the statement "Wolves should be protected from hunting and lethal control because of their cultural significance," BR or NT was the most significant predictor (Table 5). Respondents reporting higher INCOME were more likely to disagree with this

statement ($\chi^2 = 28.24$, $p < .001$). HUNTER was also a significant predictor ($\chi^2 = 14.35$, $p = .0002$) where hunters were more likely to disagree with this statement. Older respondents were more likely to agree with this statement ($\chi^2 = 6.12$, $p = .013$). For the question "In your opinion, the wolf population in Wisconsin should be kept below . . .," BR or NT was the most significant predictor (Table 5). LIVESTOCK was also a significant predictor ($\chi^2 = 8.67$, $p = .003$) where respondents who reported livestock as a major source of income were more likely to choose lower numbers of wolves or no wolves. Respondents who reported lower levels of education were also more likely to choose lower numbers of wolves or no wolves ($\chi^2 = 15.47$, $p < .001$).

In the logistic regressions run on two wolf policy questions, BR or NT was significant in seven of the eight regressions (Tables 6 and 7). In response to "Do you think there should be a public hunting or trapping season on wolves?" the predictor BR or NT was significant in two of the four regressions (Table 6). BR were more likely to choose "No, never" than NT. Being a hunter, owning livestock currently or in the past, and NT were significant predictors of the response "Yes, immediately." Hunters and those with a post-graduate education were least likely to choose "Yes, but only when depredations become unmanageable" (Table 6). In response to "If a wolf kills a family pet (e.g. dog or cat)," the predictor BR or NT was the only significant predictor in 3 of the 4 regressions (Table 7). Respondents reporting "some high school" as their level of education were also more likely to choose "Authorities should kill the wolf."

Table 6

Logistic regressions for forced-choice question: "Do you think there should be a public hunting or trapping season on wolves?" Among Bad River tribal respondents (BR) and non-tribal respondents (NT) ($n = 743$)

Answer option	Predictor	χ^2	p-value	Interpretation
Yes, immediately	BR or NT ($\beta = .65$)	30.38	<.0001	NT, hunters, and livestock owners (current or past owners) more likely to choose this answer option
	HUNTER ($\beta = .55$)	15.50	<.0001	
	LIVESTOCK ($\beta = .03$)	7.83	.0051	
Yes, but only when depredations become unmanageable	HUNTER ($\beta = -.26$)	5.52	.0188	Hunters and those reporting lower education levels less likely to choose this answer option
	EDUCATION ($\beta = -.66$)	6.65	.0099	
Yes, as soon as biologists think the wolf population can sustain annual harvests	—*	—	—	No predictors were found to significantly affect choosing this answer option
No, never	BR or NT ($\beta = -.96$)	54.24	<.0001	NT less likely to choose this answer option

Only the significant predictors are shown.
*No significant predictors.

Table 7

Logistic regressions for forced-choice question: "If a wolf kills a family pet (e.g. dog or cat)" among Bad River tribal respondents and non-tribal respondents ($n = 732$)

Answer option	Predictor	χ^2	p-value	Interpretation
Authorities should take no immediate action toward the wolf, but monitor the situation[a]	BR or NT[b] ($\beta = -.56$)	12.47	.0004	NT less likely to choose this answer option
Authorities should capture and relocate the wolf to a wilderness area[a]	BR or NT ($\beta = -.27$)	7.76	.0053	NT less likely to choose this answer option
Authorities should try to frighten the wolf away or deter it from approaching residential areas[a]	BR or NT ($\beta = -.47$)	8.01	.0046	NT less likely to choose this answer option
Authorities should kill the wolf[a]	BR or NT ($\beta = .64$)	42.66	<.0001	NT more likely to choose this answer option and those reporting "some high school" for education level less likely to choose this answer option
	EDUCATION ($\beta = -.71$)	5.62	.0178	

Only the significant predictors are shown.
[a]As per Manfredo et al. (1998).
[b]BR = Bad River tribal respondents; NT = non-tribal respondents.

Discussion

Bad River tribal respondents (henceforth BR Ojibwe) had significantly different attitudes towards wolves and different preferences for wolf policy than our comparison set of non-tribal respondents who also lived in Wisconsin's wolf range. BR Ojibwe held more positive attitudes toward wolves and were more supportive of protective wolf policy. BR Ojibwe were less supportive of lethal control actions for wolves suspected of depredations and less likely to approve an immediate public hunting or trapping season on wolves. Whereas income, education, experience with hunting, and owning livestock predicted differences in attitude, the strongest predictor was whether a respondent was BR Ojibwe or not. Although we found notable variation within each sample (Shelley, 2010) our results appear consistent with the Ojibwes' particular cultural relationship with the wolf. This cultural relationship with the wolf was associated with strong positive attitudes toward wolves and protective wolf policy and outweighed the effects of other factors commonly associated with attitudes toward wildlife (such as education level, sex, or being a hunter) (Schanning, 2009; Williams et al., 2002).

Although many Native American tribes hold similar epistemologies concerning the reciprocal and nurturing relationship between nature and humans (Cajete, 2000), the creation story, as recounted in the introduction, is unique to the Ojibwe. Wolves are often referred to as brothers and sisters with a perception, or prediction, that what happens to the wolf, will also happen to the Ojibwe (Peacock & Wisuri, 2002). Many Ojibwe see the recovery of wolves in Wisconsin as parallel to the tribes' own cultural, economic, and political recovery (David, 2009). This sentiment of "what happens to wolves, happens to the Ojibwe," may have shaped BR Ojibwe responses to our questions asking about limiting or capping the wolf population. A BR Ojibwe might interpret this question as asking about a cap on the population of a brother, or for a cap on the population of Ojibwe. Similarly, when asked about a possible public wolf harvest, one tribal council member said, "If people start hunting wolves, just imagine the implications for the Ojibwe" (Anonymous Bad River Tribal council member, pers. comm. 3/09).

Although our samples' distinct cultural relationships with the wolf were revealed in distinct attitudes, there existed variation and nuance within each sample. For example, not all Ojibwe opposed a public wolf harvest and likewise, not all non-tribal respondents supported an immediate harvest. Although a significantly higher percentage of BR Ojibwe opposed a public wolf harvest (39% compared to 7% of non-tribal respondents), this varied according to how the harvest was justified (24% BR Ojibwe reported they would support a harvest if designed for depredation management). Others expressed the importance of balancing hunting opportunities with cultural credo, as one tribal member wrote:

> Wolves present a bit of a paradox for me. I love them in the woods with me, hearing them, cutting their tracks, seeing their kills, and seeing them. Culturally I know their story in regards to my culture but if they are abundant enough to sustain a limited harvest I support hunting and trapping, partly because I believe my people long ago took wolves when they needed one, but also because I am so passionate about maintaining and increasing hunting and fishing opportunities for all peoples. I believe there can be a balance. [5/09, questionnaire open comment section, anonymous Bad River tribal member]

This exemplifies how some BR Ojibwe would support a wolf harvest, particularly if it were aimed at increasing hunting opportunities in general, which are important to tribal and non-tribal communities alike. Another tribal member expressed concerns about the reasons behind a public wolf harvest writing:

> Wolves were harvested [historically] by Native Americans, however the wolf selected was harvested compassionately. Usually it was those wolves disconnected from the pack and scavenging. Those wolves were less likely to survive without the pack; just as an Anishinabe would less likely be Anishinabe without the tribe. [5/09, survey open comment section, anonymous Bad River tribal member, *Anishinabe* is the word for the Ojibwe people in Ojibwe language]

While these nuances are present within the BR sample, the general results of our survey and public discussion revealed that BR Ojibwe were significantly more likely to hold protection-oriented attitudes to wolves and were less likely to support a public wolf harvest than non-tribal respondents.

Political Implications

In light of wolf recovery, other states in the western United States, namely, Idaho and Montana, implemented public wolf harvests in 2010 (IDFG, 2010; MFWP, 2010). Legalizing wolf harvests has prompted highly volatile debates across the nation and front-page news (Chadwick, 2010; Lee, 2010; Yardley, 2009). Managers in Wisconsin are watching closely as they have also been considering a possible future wolf harvest (Treves, 2008). Tribal opinion on this decision is particularly relevant given that they have legal claim to half of any wolf harvest in the ceded territories that overlap much of wolf range in Wisconsin (Satz, 1991; Wydeven et al., 2009). While our results do not apply to all Native Americans or even all Ojibwe bands, we predict the tribes in the Western Great Lakes region would likely be conservative about a public wolf harvest and particularly sensitive to how the hunt is justified and designed.

Beyond the particular political implications of Bad River Ojibwe attitudes to wolves, there is a broader lesson about respectfully incorporating the variation of attitudes towards wolves into wolf policy. Wolves provide an arena to tease out the complexities of diverse human values. It is the job of the managers, politicians, and scientists to construct a semblance of cohesion before moving forward. The management of wolves can be viewed in a way that incorporates a respect for the animal, human welfare, and the places where the two overlap. Heberlein (2005) points out that even the term "management" has an embedded dominionistic meaning. He contrasts "management" with the Swedish translation of that word that enfolds the idea of "care-giving" and is closer to stewardship. Management requires one to hold a position above the wildlife, having control over the wolves and their very existence. By contrast, care-giving calls for a more nurturing relationship of humans to wolves. Heberlein (2005) suggests that by altering the mindset of management to care-giving, less invasive conservation strategies can be achieved. Likewise, the particular relationship the Ojibwe have with the wolf, and the history they share, offers a distinct worldview that deserves greater attention in formal policy, particularly in the search for long-term coexistence.

Concluding Comments

Quantitative surveys offer only a partial picture of the meaning of wolves to people and their opinions about management. But given the formalized and often bureaucratic nature of public debate, efforts to measure and quantify attitudes among tribal citizens can improve public dialogue and build a more representative picture of public opinion. Seeking approval for research, collaboration, and dissemination and building in opportunities for feedback from tribal members is critical. Quantifying attitudes could risk masking ambiguities and nuance in opinion as people may have contradictory or ambivalent attitudes toward carnivores (Goldman, Roque De Pinho, & Perry, 2010).

Tribal participation in Wisconsin's wolf management specifically has recently increased with collaborations between the WDNR, the United States Department of Agriculture-Wildlife Services, and tribal agencies (Wisconsin, 2008). Co-investigations of human–wolf conflict within the six-mile buffer zone around reservations in Wisconsin and wolf collaring and tracking efforts on the Bad River reservation are examples of successful collaboration efforts. By understanding human–wolf relations in the United States and within the tribes, perhaps points of overlap in ideology can be found in an effort to work toward inclusive and less politically contentious wolf policy.

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