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Contributed Paper

Moral dimensions of human–wildlife conflict

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Abstract: *Despite increasing support for conservation globally, controversy over specific conservation policies persists among diverse stakeholders. Investigating the links between morals in relation to conservation can help increase understanding about why humans support or oppose policy, especially related to human–wildlife conflict or human conflict over wildlife. Yet the moral dimension of human–wildlife conflict has mostly gone unconsidered and unmeasured; thus, policy and programmatic efforts to reduce controversy may be missing a key part of the equation. We conducted a web-based survey (*n = *1239 respondents) in Michigan (U.S.A.) to investigate cognitive and emotional influences on the value–behavior relationship. Respondents were identified by their interest and involvement in Michigan wolf management. The survey consisted of questions about values, emotions, cognitions, and behaviors relative to wolves in Michigan. We used path analysis to explore whether emotions and cognitions mediated the relationship between value and behavior. Most respondents attributed intrinsic value to wolves (*n = *734) and all life (*n = *773) and engaged in behaviors that benefited wolf populations and ecosystems regardless of stakeholder group (e.g., environmentalist, farmer). Attributing intrinsic value to wolves was positively related to favorable emotions toward wolves and cognitive assessments that hunting and trapping of wolves is unacceptable. Despite similarities in attribution of intrinsic value, groups differed in emotions and cognitions about wolf hunting. These differences provide a useful way to predict stakeholder behavior. Our findings may inform interventions aimed at increasing support for wolf management policies and positive interactions among stakeholders and wildlife. Leveraging agreement over intrinsic value may foster cooperation among stakeholders and garner support for controversial conservation policy.*

Keywords: *Canis lupus*, cognition, emotion, gray wolves, human–wildlife conflict, Michigan, moral foundations theory

Las Dimensiones Morales del Conflicto Humano – Animal

Resumen: *A pesar del creciente apoyo para la conservación a nivel mundial, todavía existe controversia sobre políticas de conservación específicas entre varios actores involucraados. Investigar la conexión entre la moral en relación con la conservación puede ayudar a incrementar el entendimiento sobre por qué los humanos apoyan o se oponen a las políticas, especialmente las relacionadas con el conflicto humano – animal o con el conflicto humano sobre los animales. A pesar de esto, la dimensión moral del conflicto humano – animal en general no es considerada ni medida; por esto, las políticas y los esfuerzos programáticos para reducir la controversia pueden ser una parte clave faltante de la ecuación. Realizamos una encuesta en línea (*n = *1239 encuestados) en Michigan (E.U.A) para investigar las influencias cognitivas y emocionales sobre la relación valor-comportamiento. Los encuestados fueron identificados por su interés y participación en el manejo de lobos en Michigan. La encuesta consistió de preguntas sobre los valores, emociones, cogniciones y comportamientos en relación a los lobos en Michigan. Usamos un análisis de pautas para explorar si las emociones y cogniciones mediaban la relación entre el valor y el comportamiento. La mayoría de los encuestados les atribuyeron valor intrínseco a los lobos (*n = *734) y a todos los seres vivos (*n = *773) y participaban en comportamientos que beneficiaban a las poblaciones de lobos y a sus ecosistemas sin importar el grupo de accionistas (por ejemplo, ambientalistas, granjeros). Atribuirles valor intrínseco a los lobos estuvo relacionado positivamente con emociones favorables hacia los lobos y valoraciones cognitivas*

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de que la caza y el trampeo de lobos no son aceptables. A pesar de las similitudes en la atribución de valores intrínsecos, los grupos discreparon en emociones y cogniciones sobre la caza de lobos Estas diferencias proporcionan un método útil para predecir el comportamiento de los grupos de interés. Nuestros hallazgos pueden informar a las intervenciones enfocadas en incrementar el apoyo para las políticas de manejo de lobos y las interacciones positivas entre los actores involucrados y los animales. Hacer uso de los acuerdos sobre el valor intrínseco puede fomentar la cooperación entre los actores involucrados y ganar el apoyo para políticas de conservación controversiales.

Palabras Clave: *Canis lupus*, cognición, conflicto humano – animal, emoción, lobo gris, Michigan, teoría de los fundamentos morales

Introduction

Resolving negative effects of human–wildlife conflict (HWC) is one of conservation's most pressing endeavors (Madden 2004). Human-wildlife conflict is traditionally defined as direct conflicts between humans and wildlife (e.g., crop raiding). Human–human conflicts over how to manage wildlife can often prove more complicated than direct conflicts between humans and wildlife (Dickman 2010), and they play out in arenas from court rooms to public lands (Minnis 1998; Triezenberg et al. 2011). Human–human conflict occurs because humans choose to conserve what they value and disagreements regarding values can be deeply personal. A value is "an enduring belief that a particular mode of conduct or . . . end-state of existence is personally and socially preferable" (Rokeach 1968). Preferences for conservation programs or policies may be determined in large part by what in nature is valued and why. In conservation morals include attitudes about right and wrong related to valued entities in nature. Assessing morals and analyzing their relationship with conservation-relevant behaviors may help predict reactions to policy alternatives (de Groot et al. 2011; de Groot 2014). Better understanding and methodologically robust measurements of how morals affect behavior are needed to benefit HWC management and provide decision makers with additional tools for navigating tradeoffs in decision making (Vucetich & Nelson 2013; Sacchi et al. 2014). Human–wolf conflicts are one of the most ubiquitous and globally distributed HWC. To improve decision processes and policy in the HWC case of wolf management in Michigan (U.S.A.), we explored multiple measures of conservation morals and the influence of these morals on behavior (Table 1).

A substantial body of research has been dedicated to understanding how values influence behavior in conservation (Stern 2000) through the application of, for example, cognitive hierarchy (Whittaker et al. 2006) and value-belief-norm theories (Stern et al. 1999). Extant research is revealing value shifts from domination to mutualism that are related to increased conservation support (Inglehart 1990; Manfredo et al. 2016). Morals specifically have been less explored in conservation. Our conceptualization of morals refers to whether an individual person attributes intrinsic value to entities in nature (i.e., are individual animals, wildlife species, or whole ecosystems valued in their own right beyond material use to humans [Callicott 1979; Nelson & Vucetich 2012]). For instance, some stakeholders oppose trophy hunting as a means to generate conservation funds because they believe the individual animal's intrinsic value is not outweighed by the economic value gained from killing it (Conniff 2014). Others support hunting because they value meat and revenue generated over the animal's intrinsic value. Thus, quantifying entities to which humans attribute intrinsic value is one way to categorize morals. Anthropocentrism attributes intrinsic value only to humans; zoocentrism to some nonhuman animals in addition to humans; biocentrism to all living things; and ecocentrism includes ecological collectives in the "moral community" of those with intrinsic value (Nelson & Vucetich 2012). It is not our intent to critique stakeholder morals, simply to assess them.

Moral foundations theory (MFT) explains morals as intuitions rooted in at least 5 foundations, that is determinants of right and wrong: authority addresses respect for established tradition and hierarchy; care relates to avoiding harm and encouraging care; fairness focuses on rights, autonomy, and justice; in-group loyalty involves obligations to a social group; and disgust emphasizes what is perceived as clean or decent and avoids contamination of body or mind. Research on MFT has been prolific and has received broad empirical support (Haidt 2007; Graham et al. 2013). It is known that humans vary in their emphasis of each moral foundation; some concerns are more important to an individual than others (Haidt & Graham 2007). Knowing which concerns humans emphasize can help diagnose why they fundamentally disagree over a policy. For example, someone who is most concerned about care may be opposed to lion hunting because they do not want to see harm (e.g., stress from being hunted, pain in death) inflicted on individual lions. Someone who emphasizes care and authority may value local traditions that include lion hunting and may be more open to a hunting policy if it is sustainable for lion populations. To our knowledge, MFT has never been applied to a conservation context. Thus, we included the 5 moral foundations in our examination of conservation morals.

Psychology has also explored the extent to which morals are influenced by emotions and cognitions (Smith

Table 1. Traditional and novel measures of cognitive hierarchy theory explored in the case study of human conflict with wolves in Michigan.

Research question	*Concept based on cognitive hierarchy theory*	*Definition*	*Specific concept measured in study*	*Definition*	*Citation*
What concepts are morally relevant in HWC?	value	stable, super-ordinate cognitive structure that guides a person in interpreting events and are present across events	intrinsic value	inherent value of someone or thing beyond instrumental use to someone else	Callicott 1979
	cognition	mental processes used in reasoning and understanding	acceptability	a judgment assessing whether an action (e.g., hunting, trapping) is permissible	Smith & DeCoster 2000; Bruskotter et al. 2009
	affect	positive and negative feelings	emotional dispositions	intuitive reactions to various scenarios about wildlife conflict scenarios	Smith & DeCoster 2000; Vaske et al. 2013
	intuition	mental processes that lead to judgment with little to no conscious reasoning	moral foundations	intuitive ethical considerations to determine right and wrong	Haidt 2007
	behavior	manifest, observable response in a given situation and specific object	conservation	actions taken to benefit an animal, species, habitat or ecosystem	Holsman 2000; Stern 2000; Treves 2012
	socio-demographic	social and/or demographic aspects of an individual	stakeholder group	affiliation with a group with specific interests in HWC	Lute & Gore 2014*a*
			age	number of years since birth	Vaske 2008
			education	number of years in school	
			gender	identification as male, female or other	
			income	household earnings	
			political party	affiliation with democrat, independent or republican parties	
			political orientation	identification as conservative, moderate or liberal	

& DeCoster 2000). Debate often focuses on whether emotions or cognitions are more influential on behavior (Haidt 2001; Paxton & Greene 2010). To explore the dual influences of emotions and cognitions on conservation behavior, we measured affective evaluations based on a concept psychologists call emotional dispositions (Vaske et al. 2013) and cognitive assessments of management acceptability (Bruskotter et al. 2009; Jacobs et al. 2012). Emotional dispositions are reactions of anger or sympathy to various scenarios that may influence how individuals think wildlife should be managed (Vaske et al. 2013). We measured cognitive assessments of the acceptability of hunting of wolves because hunting is at the center of current human–human conflict over wolves.

We explored the relationship between morals and conservation-relevant behaviors (Table 1) to understand policy preferences and predict human behavior related to wolves in Michigan. We adapted the cognitive hierarchy framework (i.e., values are the foundation and influence attitudes at the second level of the framework, which in turn influence behaviors) to understand morals in HWC (Whittaker et al. 2006). Cognitive hierarchy is one of many theories from the psychological and behavioral sciences applied in conservation biology (e.g., Schwartz's [1999] norm-activation model, Stern's [2000] value-belief-norm theory). We adapted cognitive hierarchy for this research because it structurally aligns with the factors we measured. These factors were identified as germane to our case study through exploratory studies (Lute & Gore 2014*a*, 2014*b*). Accordingly, our framework is structured such that attribution of intrinsic value is a foundational mental construct that may influence conservation behavior (Rokeach 1968; Stern 2000) and specific emotions, intuitions, and cognitions may filter the relationship between intrinsic value and conservation behavior (Azjen & Fishbein 1977; Smith & DeCoster 2000). Our objectives were to assess attribution of intrinsic value (independent variable) among stakeholders in Michigan wolf management who were familiar with HWC; emotions, intuitions, and cognitions related to the case study; conservation behavior (dependent variable); and analyze the relationship between intrinsic value and behavior.

Methods

Study Site and Sample Population

We surveyed a segment of stakeholders throughout Michigan, although wolves are currently found only in the Upper Peninsula of Michigan. The HWC related to wolves in Michigan, and often elsewhere, centers on wolf depredation of domestic animals, wolves' impact on abundance of game, and risk to human safety (Lute et al. 2012). Wolves also play an important role in Native American culture and spirituality; respect for this human–wolf relationship is another source of conflict (Shelley et al. 2011). Stakeholder conflict over wolf management in Michigan is dominated by whether wolves should be hunted (Lute & Gore 2014*b*; Lute et al. 2014).

In October–November 2013, we contacted Michigan citizens age 18 years or older involved in wolf management through organizations represented on the Michigan Wolf Management Advisory Council (WMAC), a group of stakeholders regularly involved with Michigan Department of Natural Resources (MDNR) (for more information on the WMAC, see Gore and Lute [2013]). These stakeholders represent diverse and relevant identities, including animal-welfare or animal-rights advocates, conservationists, environmentalists, hunters and trappers, livestock owners, and tribal members (Gore & Lute 2013). We focused our initial sampling efforts on these "issue publics" (i.e., highly involved and aware stakeholders) because they are the most likely to influence wolf management and related policy (Grunig 1979; Iyengar et al. 2008). Additional groups were not identified in previous research among a similar population (Lute & Gore 2014*a*, 2014*b*), suggesting external (i.e., MDNR) and internal (i.e., public stakeholders) validation of sample representativeness.

Survey

The survey was designed and hosted in Qualtrics, an online survey platform, and distributed by asking WMAC members to share the survey hyperlink with their fellow members through listserves and webpages (Paolacci et al. 2010). We used this technique to balance representative sampling while optimizing response rates under the assumption that potential respondents would be more likely to participate if they were contacted from within, rather than outside, their networks (Cohen & Arieli 2011). We enabled the "prevent ballot box stuffing" option in Qualtrics to prevent participants from submitting more than one response.

The survey instrument was designed to measure intrinsic value, the 5 moral foundations, cognition, emotion, behavior relative to wolf management, and sociodemographics (Table 1) through multiple-choice questions on a range-response Likert-type metric or *yes* or *no* options (Supporting Information). For all concepts except intrinsic value, construct validity (i.e., equivalence in meaning and interpretation) was maintained by using at least 3 questions to measure and create a composite variable for each concept (Creswell 2009). We assessed reliability of all composite variables with Cronbach's $\alpha \geq 0.7$ as the cutoff (Cronbach 1951).

Our first objective was to assess attribution of intrinsic value among stakeholders familiar with Michigan wolf management. To do so, we measured intrinsic value, our independent variable, attributed to wolves (i.e., which would indicate an individual was at least zoocentric).

Table 2. Summary statistics of values, emotions, cognitions, behaviors, and sociodemographics from a survey of stakeholders in the human–wolf conflict in Michigan.

Concept	*Item*	*Mean*	*SD*	*Alpha*	*n*
Biocentric	All living things have intrinsic value.	3.98	1.06	N/A	921
Anthropocentric	Only humans have intrinsic value.	1.99	1.11		
Zoocentric	Wolves have intrinsic value.	3.98	1.06		
Hunting	To what extent is each of the following activities acceptable to you? hunting wolves	3.79	1.31	N/A	992
	hunting wolves with dogs	2.92	1.46		
Cognition: unacceptability of hunting	hunting wolves is acceptable (Please check all that apply): because hunting is a tool to reduce conflict	0.61	0.49	0.84	1006
	because it ensures human safety	0.38	0.49		
	because it will increase people's acceptance of wolves	0.17	0.37		
	because it will increase wolves' fear of humans	0.40	0.49		
	because people want to hunt wolves	0.20	0.40		
	because wolf populations can sustain hunting	0.65	0.48		
	to maximize economic benefits (e.g., livestock production, revenue from pelts)	0.32	0.47		
	to obtain a wolf as a trophy	0.17	0.37		
	to obtain pelts as a livelihood	0.17	0.38		
	to participate in natural processes (e.g., as a predator in an ecosystem)	0.47	0.59		
	to protect pets or livestock from immediate threats	0.73	0.42		
	to protect wolves' prey base	0.34	0.48		
	when nonlethal methods have not worked	0.35	0.48		
Trapping	To what extent is each of the following activities acceptable to you? trapping wolves	3.47	1.48	N/A	960
Cognition: unacceptability of trapping	trapping wolves is acceptable (Please check all that apply):	0.54	0.50	0.87	990
	because trapping is a tool to reduce conflict				
	because it ensures human safety	0.32	0.47		
	because it will increase people's acceptance of wolves	0.14	0.35		
	because it will increase wolves' fear of humans	0.21	0.41		
	because people want to trap wolves	0.21	0.41		
	because wolf populations can sustain trapping	0.56	0.50		
	to maximize economic benefits (e.g., livestock production, revenue from pelts)	0.30	0.46		
	to obtain a wolf as a trophy	0.14	0.34		
	to obtain pelts as a livelihood	0.25	0.43		
	to participate in natural processes (e.g., as a predator in an ecosystem)	0.37	0.48		
	to protect pets or livestock from immediate threats	0.60	0.49		
	to protect wolves' prey base	0.29	0.45		
	when nonlethal methods have not worked	0.29	0.45		
Emotions	I do not understand why people object to hunting or trapping wolves.*	2.82	1.39	0.84	838

Continued

Table 2. Continued.

Concept	*Item*	*Mean*	*SD*	*Alpha*	*n*
	I feel sorry for people who have to live in fear of wolves.*	3.46	1.24		
	I feel sorry for wolves when they are killed for any reason.	2.33	1.37		
	I get angry when I learn that a wolf has killed someone's livestock.*	3.16	1.20		
	I get angry when I think about hunters shooting wolves.	2.17	1.46		
	I get angry when I think about wolves caught in traps.	2.49	1.59		
	The thought of wolves killing prey saddens me.*	2.19	1.21		
	Ranchers losing livestock to wolves saddens me.*	3.45	1.17		
Moral foundations	authority	3.03	0.94	N/A	972
	fairness	3.55	0.86		
	harm/care	2.98	1.05		
	ingroup	2.90	0.97		
	purity	2.97	1.14		
Conservation Behaviors	attended a legislative hearing or organizational meeting	0.16	0.37	0.82	855
	boycotted or avoided buying the products of a company because of their stance on wolf management	0.09	0.29		
	donated money to a group	0.17	0.38		
	called or wrote a letter to a legislator	0.24	0.43		
	educated others	0.37	0.48		
	managed land to create or conserve wolf habitat	0.05	0.21		
	read newsletters, magazines or other publications	0.57	0.50		
	signed a petition	0.29	0.46		
	volunteered with a group	0.11	0.32		
	voted for a candidate in an election based at least in part because of his/her stance on wolf management	0.13	0.33		
	wrote a letter to a newspaper or called in to a news program	0.07	0.25		
Stakeholder group	animal welfare or rights advocate	2.44	1.39	N/A	867
	conservationist	4.25	0.85		
	environmentalist	3.87	1.03		
	farmer	3.22	1.25		
	gun rights advocate	3.99	1.29		
	hunter	4.20	1.25		
	property rights advocate	3.89	1.07		
	wildlife advocate	4.15	0.96		
Socio-demographic	age	53.80	13.64	N/A	855
	education	5.18	1.94		
	gender	1.52	0.88		
	income	6.37	1.93		
	political party	3.57	1.54		
	political orientation	4.41	1.57		

* *Reverse coded*

We also measured intrinsic value in relation to humans only (anthropocentric) and all life (at least biocentric) (Table 2). Another question measured reasons why, if applicable, respondents might attribute intrinsic value to wolves.

Our second objective was to assess emotions, intuitions, and cognitions related to wolf management. We used the cognitive measure of acceptability of hunting and trapping. In the survey, the acceptability of 13 separate reasons for hunting and trapping wolves ($\alpha = 0.84$

hunting, $\alpha = 0.87$ trapping [Table 2]) were presented. We also assessed opposition to hunting wolves, hunting wolves with dogs, and trapping wolves (Bruskotter et al. 2009). We measured emotional dispositions (Vaske et al. 2013) with 5 items relative to human considerations (i.e., anger about antihunting attitudes and wolf presence; sympathy for ranchers, residents in wolf territories, and wolves' prey) against 3 opposing items relative to wolves (i.e., anger about hunting and trapping wolves; sympathy for wolves). To create a single index variable, we reverse-coded the 5 items endorsing human considerations and averaged all 8 items ($\alpha = 0.84$); thus, higher numbers indicated emotions favoring wolves and low values favored humans. We used Haidt's (2007) 20-item scale to measure the 5 moral foundations (authority, care, fairness, in-group, and disgust). Each item was ranked on a 6-point scale (see http://moralfoundations.org for details on measures).

Our third objective, to assess conservation behavior, was achieved by measuring participation of respondents in 11 activities that support wolves (Stern et al. 1999; Treves & Martin 2011). Most options were civic actions (e.g., voting, volunteering), but others were private-sphere actions such as reading to be more educated about wolf management and managing land for wolf habitat. We used an index to sum the 11 behaviors (Table 2) and classified respondents along a spectrum from inactive (0) to very active (11) ($\alpha = 0.82$). We also asked whether motivation for conservation behaviors was intended to benefit individual wolves, wolf populations or species, or ecosystems.

We present findings based on sociodemographic (e.g., age, education, gender, income, political ideology, political party affiliation) and stakeholder groups (e.g., animal-welfare or animal-rights advocates, conservationists, environmentalists, farmers, gun-rights advocates, hunters, property-rights advocates, and wildlife advocates [Lute & Gore 2014*a*]).

Data Analyses

Our fourth objective was to analyze influences on the relationship between value and behavior. To explore whether relationships between individual variables were significant, we conducted regressions between the attribution of intrinsic value to wolves and 21 variables (1 emotion measure, 5 moral foundations, 2 cognitive measures related to hunting and trapping, 5 sociodemographic, and 8 stakeholder groups). We then conducted regressions between behavior and the same 21 variables. Then we used mediation, or path, analysis (Baron & Kenny 1986) to test hypothesized value–behavior relationships. Mediation suggests a causal and stepwise psychological process, or pathway: independent variable (IV) to mediator to dependent variable (DV), where the mediator explains a statistically significant proportion of the relationship between IV and DV. To analyze influences on the value-behavior relationship, we used standardized z scores to test whether 8 variables (i.e., cognition, emotion, 5 moral foundations) mediated the effect of intrinsic value of wolves on behavior with the sgmediation module in STATA (version 13.1, StataCorp, College Station, TX, U.S.A.). This test was followed by bootstrapping (5,000 iterations) to calculate standard errors (Preacher & Hayes 2008). We dropped cases with missing data in the DV because our sample size was large enough to do so without compromising results. We used an expectation maximization algorithm to estimate maximum likelihood to account for missing data (Ullman 2006). Cases with missing data in any of the items (for indices) or the DV (for analyses) were excluded; therefore, sample sizes varied by analysis (Schafer & Graham 2002; Preacher & Hayes 2004). Exploration of data did not reveal that data were missing in a frequency or pattern that would require multiple imputation (Graham et al. 2007; UCLA Statistical Consulting Group 2013). Because data were not meant to be representative and maximum likelihood estimates are superior when addressing potential biases, we did not weight data (Schafer & Graham 2002). The MSU Committee on Research Involving Human Subjects (IRB x11-1144e) reviewed and approved methods used in this research.

Results

Our sample of 1239 respondents was skewed toward white (68%, $n = 837$) males (76%, $n = 699$) and people who identified as conservationists (19%, $n = 240$) and hunters (32%, $n = 398$). Age, education, and income were normally distributed. A small proportion (8%, $n = 101$) of respondents were anthropocentric (Fig. 1). A majority agreed wolves (59%, $n = 734$) and all life have intrinsic value (62%, $n = 773$).

More respondents accepted hunting (57%, $n = 706$) and trapping wolves (46%, $n = 575$) than opposed hunting (17%, $n = 212$) and trapping wolves (21%, $n = 266$). Respondents were divided on support for hunting wolves with dogs (28% agreed [$n = 347$] and 29% disagreed [$n = 353$]). The most common reasons for accepting hunting and trapping were to protect pets and livestock from immediate threats and as a tool to reduce HWC. Conservationists, farmers, gun-rights advocates, hunters, and property-rights advocates expressed emotions favoring humans, whereas animal-rights and -welfare advocates, environmentalists, and wildlife advocates expressed emotions favoring wolves (Fig. 2).

Fifty-eight percent of respondents ($n = 589$) indicated they engaged in some form of conservation. The 5 most common behaviors were read materials (61%, $n = 485$), educated others (40%, $n = 318$), signed a petition (31%,

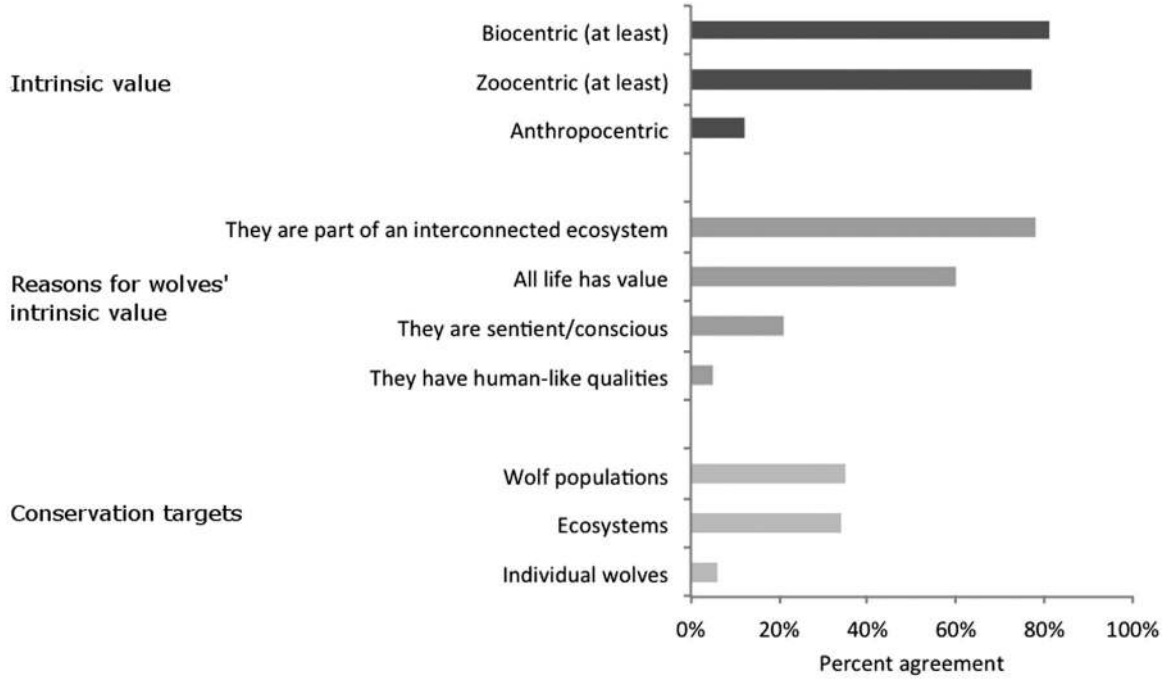

Figure 1. Percentage of respondents in a survey of Michigan wolf stakeholders who agreed with conservation-relevant morals.

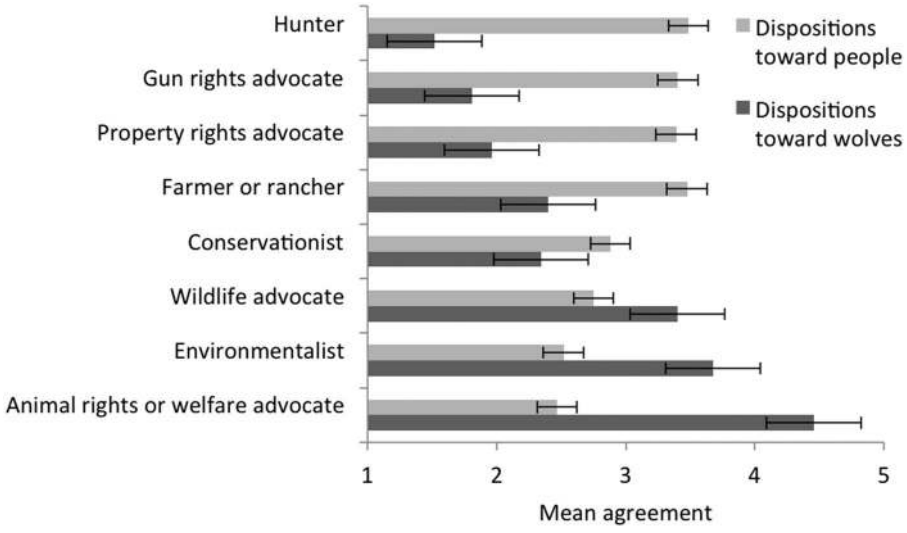

Figure 2. Mean (SE) agreement among stakeholder groups relative to their disposition toward people versus wolves in a survey of Michigan wolf stakeholders. For example, hunters had a higher mean agreement with emotions favoring humans, whereas animal rights and welfare advocates had a higher mean agreement with emotions favoring wolves.

$n = 252$), contacted legislators (26%, $n = 207$), and donated money (22%, $n = 176$).

Initial correlations revealed 6 sociodemographic and stakeholder-group variables—education, gender, animal-rights and -welfare advocates, conservationists, environmentalists, wildlife advocates—positively linked to intrinsic value of wolves. Seven variables were negatively linked: income, political party, political orientation, farmers, gun-rights advocates, hunters, and property-rights advocates (Table 3). Similarly, behavior was positively linked to the same 6 variables and negatively linked to 5 variables: political party, political orientation, gun-rights advocates, hunters, and property-rights advocates.

Three variables mediated the relationship between value and behavior. Emotion favoring wolves was the strongest mediator, explaining 62% of the total effect between intrinsic value and behavior ($\beta = 0.20$; SE = 0.02; $p \leq 0.001$; CI, 0.16–0.24). The unacceptability of hunting wolves mediated 58% of the total effect ($\beta = 0.18$; SE = 0.02; $p \leq 0.001$; CI, 0.14–0.22). The unacceptability of trapping wolves mediated 45% of the total effect ($\beta = 0.13$; SE = 0.02; $p \leq 0.001$; CI, 0.10–0.17).

Table 3. Initial regressions of factors related to intrinsic value and conservation of wolves as determined from a web-based survey of stakeholders in the human-wolf conflict in Michigan ($n = 855$ respondents).

Concept	*Item*	*Intrinsic value of wolves: β (SE)*	*Conservation of wolves: β (SE)*
Cognition	acceptability of hunting	−0.42 (0.03)[a]	−0.48 (0.03)[a]
	acceptability of trapping	−0.39 (0.03)[a]	−0.42 (0.03)[a]
Emotion	emotional dispositions	0.49 (0.03)[a]	0.47 (0.03)[a]
Moral Foundations	care	0.22 (0.03)[a]	0.27 (0.03)[a]
	fairness	0.11 (0.03)[b]	0.17 (0.03)[a]
	authority	−0.18 (0.03)[a]	−0.20 (0.03)[a]
	ingroup	−0.20 (0.03)[a]	−0.15 (0.03)[a]
	disgust	−0.15 (0.03)[a]	−0.07 (0.03)[c]
Stakeholder group	animal rights and welfare advocates	0.42 (0.03)[a]	0.44 (0.03)[a]
	conservationists	0.26 (0.03)[a]	0.19 (0.03)[a]
	environmentalists	0.36 (0.03)[a]	0.27 (0.03)[a]
	wildlife advocates	0.23 (0.03)[a]	0.26 (0.03)[a]
	farmers	−0.13 (0.03)[a]	−0.11 (0.03)
	gun rights advocates	−0.31 (0.03)[a]	−0.35 (0.03)[a]
	hunters	−0.28 (0.03)[a]	−0.36 (0.03)[a]
	property rights advocates	−0.25 (0.03)[a]	−0.23 (0.03)[a]
Sociodemographic	age	0.01 (0.03)	−0.05 (0.03)
	education	0.22 (0.03)[a]	0.12 (0.03)[a]
	gender (higher numbers = female)	0.26 (0.03)[a]	0.32 (0.03)[a]
	income	−0.08 (0.03)[c]	−0.03 (0.03)
	political party (higher numbers = Republicans)	−0.18 (0.03)[a]	−0.20 (0.03)[a]
	political orientation (higher numbers = conservatives)	−0.31 (0.03)[a]	−0.31 (0.03)[a]

[a] $p < 0.001$.
[b] $p < 0.01$.
[c] $p < 0.05$.

Of the 5 moral foundations, care mediated 15% of the total effect ($\beta = 0.05$; SE = 0.001; $p \leq 0.001$; CI, 0.03–0.07). The other 4 foundations carried <10% of total effect at $p \leq 0.05$. Of the total effect, authority mediated 8% ($\beta = 0.03$; SE = 0.008; $p \leq 0.05$; CI, 0.01–0.04); fairness mediated 5% ($\beta = 0.02$; SE = 0.006; $p \leq 0.05$; CI, 0.005–0.03), and in-group mediated 5% ($\beta = 0.02$; SE = 0.007; $p \leq 0.05$; CI, 0.004–0.03).

Discussion

Our results suggest that among our study participants, intrinsically valuing wildlife can influence morally relevant emotions and cognitions and ultimately conservation behavior. Empirical social science that enumerates the relationship between morals and conservation behavior can help inform evidence-based decision making about HWC and potentially other conservation decisions relative to, for example, ecological restoration or invasive species management. Directly incorporating morals into HWC policies and programs has been rare to date. In coupling interdisciplinary theories and established statistical methods, we found that explicitly considering morals was not only methodologically feasible, but can also predicted public support for policy alternatives in our case study.

Our mediation pathways identified 4 concepts suitable for measuring morals (i.e., intrinsic value, emotion, cognitive unacceptability of hunting, and the moral foundation of care) and informed understanding of their influence on behavior. The mediation pathways reliably predicted conservation behavior among our respondents. Thus, conservation social science can include not only wildlife- or nature-specific cognitions such as risk perception (Gore et al. 2007) or value orientations (Fulton et al. 1996) but also emotional measures, which may serve to initiate or reinforce humans' willingness or opposition to conserve wildlife. The relationship between emotions and policy support may be bidirectional. In other words, policy can cause an emotional reaction that, if strong enough, may encourage certain behaviors aimed at supporting or opposing HWC policies. Morals and underlying emotions can be considered when strategizing interventions of HWC-related behavior and may help explain why certain interventions are not effective. For example, if ranchers' anger in response to livestock depredation is strong, compensation payments may not alleviate negative feelings associated with HWC regardless of the extent to which compensation payments provide a livelihood alternative. Alternatively, if public sympathy for ranchers experiencing depredation is widespread, the public may be willing to support policies that prevent depredation with significant investments of time, money, and other resources. Communication programs in particular could benefit from explicitly incorporating morals into messaging.

Although 4 of the 5 moral foundations from MFT mediated small proportions of the value–behavior relationship, their independent effects were significant and thus were important functionally in our sample. Along with sociodemographic characteristics such as stakeholder group, gender, and political affiliations, morals could offer an additional way of segmenting stakeholders for engagement. Morals might also offer an alternative metric for predicting which groups will conserve wildlife, oppose conservation, or be inactive (e.g., Gore et al. 2011). Among the 5 moral foundations we measured, care generated the strongest connection between value and behavior. Individuals who prioritize care may more likely engage in conservation (Swart 2005; Ellingsen et al. 2014). It makes intuitive sense that individuals concerned about caring for and avoiding harm to others might apply such concerns beyond humans and thus attribute intrinsic value to and conserve wildlife (Haidt et al. 1993; Swart 2005). For example, volunteers cleaning up an oil spill are engaging in a form of conservation and are motivated to care for immediately affected wildlife and avoid harm to future life (e.g., long-term impacts of pollution). Because MFT can predict support or opposition to policy in diverse controversies (e.g., climate change, stem-cell research, terrorism [Graham et al. 2011]), stakeholder-engagement planners can have confidence using morals as a criteria for defining and identifying HWC stakeholders.

A second implication for conservation policy relates to the assumption that if a particular HWC policy alternative is not acceptable to stakeholders they are less likely to engage in conservation at large. In fact, perverse outcomes may result if stakeholders actively oppose conservation or engage in negative behaviors toward wildlife. For example, carnivore conservation efforts have been severely delayed when strategies (e.g., reintroduction, compensation schemes, recreational hunting) were unsupported by key stakeholder groups; some stakeholders have even retaliated by poaching (Liberg et al. 2012). Understanding morals underlying behavior can help isolate causes of behaviors that directly (e.g., poisoning) and indirectly (e.g., activism) impact wildlife so that consequences can be effectively addressed. By isolating the concept of morals, conservationists can be better equipped to weigh policy alternatives and specific interventions that encourage conservation and attenuate undesired behaviors. Agreement about intrinsic value attribution can help provide a starting point for evaluating trade-offs among HWC management alternatives (e.g., Rolston III 1975; Callicott 1990, 1992). For example, if stakeholders agree that certain costs (e.g., property damage) do not outweigh intrinsic value of wildlife, then HWC mitigation might focus on preventing wildlife-induced damage rather than aiming to reduce population sizes. Further, HWC policies that reflect the emotions and cognitions of the public, such as those measured by our acceptability measures (e.g., protecting pets or livestock), may be the least contested (Minnis 1998; Manfredo et al. 1999). In the context of Michigan wolf management, wolf policy that addresses emotions associated with protecting vulnerable others may be most supported.

The influence of intrinsic value on behavior is noteworthy in part because the concept facilitates consideration of different levels of moral inclusivity among diverse stakeholders (Vucetich et al. 2015). Most respondents, regardless of group identification, attributed intrinsic value to not only wolves but also to all life and ecosystems (Table 2 & Fig. 1). Although humans may more likely attribute intrinsic value to species considered charismatic or intelligent (Frey 2014), other work supports a broadening moral inclusivity of postmodern societies generally (Inglehart 1977, 1990). This knowledge coupled with our findings here suggest common perspectives of biocentrism and even ecocentrism can be leveraged as a minimum common denominator from which to launch conservation initiatives and garner support for conservation in controversial HWC. In Michigan, wolf management that is structured around and emphasizes its contributions to improved ecosystem management may result in greater support for and avoid controversies associated with wolves.

Future studies could assess morals in other HWC contexts or expand our mediation pathways to include additional measures. Our quantitative approach may be transferable to other countries and cultures, although the specific patterns in moral foundations, for instance, may differ (Haidt & Joseph 2004, 2007). We focused on exploring morals, but there are nonmoral considerations that may help explain behavior. For example, a study that includes economic values may be useful in contexts where HWC directly affects livelihoods and subsistence (Dickman et al. 2011). The importance of emotion in the value–behavior relationship is in line with findings from the behavioral sciences (Luce et al. 2001) but novel in the context of wildlife conservation, where the role of emotion in decision making has been ignored or assumed to be a weakness in those with opposing views (Lute & Gore 2014*a*). Behavioral science, including this work, suggests emotional influences on behavior and decision making are complementary to cognitions, not necessarily negative and a process that occurs naturally in everyone. The role of emotion may be particularly important in wolf management and thus one limitation of this work lies in the extent to which our case study can be applied to other contexts. Public discourse surrounding carnivore hunting, charismatic megafauna, and rare animals implies that emotions may predict public policy preferences for such species but may not be as important for underappreciated species or other entities (e.g., ecosystems, biodiversity generally).

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Supporting Information

The survey instrument (Appendix S1) is available online. The authors are solely responsible for the content and functionality of these materials. Queries (other than absence of the material) should be directed to the corresponding author.

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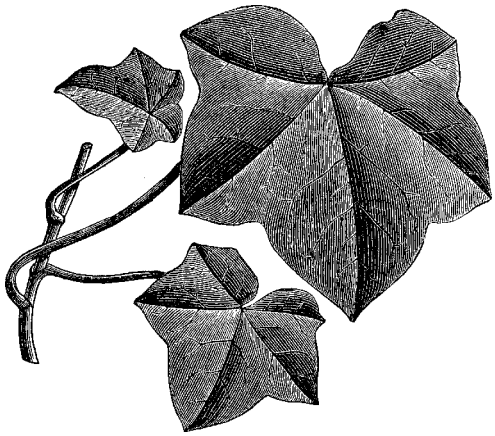
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