



On the Multiple Identities of Stakeholders in Wolf Management in Minnesota, United States

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Social identity theory offers a means to understand attitudes about wolves, with consequences for management support. Using data from a mail survey about wolves, we explored relationships among seven identities (i.e., wolf advocate, hunter, environmentalist, nature enthusiast, farmer, trapper, conservationist) using multidimensional scaling (MDS) and principal components analysis (PCA). We examined how identities correlated with political ideology, trust in a wildlife management agency, wildlife value orientations (WVOs) and attitudes about wolves, and we evaluated whether WVOs mediated the relationship between identities and attitudes. PCA suggested two factors in identifying relationships among stakeholders, while MDS and correlations found diversity among stakeholders beyond these factors. Hunter identity was most strongly associated with a domination WVO and conservative political ideology. Farmer identity was most strongly associated with agency distrust and negative wolf attitudes. Wolf advocate was most strongly associated with a mutualism WVO (i.e., beliefs that humans are meant to coexist in harmonious relationships with wildlife), agency trust, and positive wolf attitudes. Conservationist identity was positively correlated with all other identities. WVOs partially mediated the relationship between identities and attitudes.

Keywords: social identity theory, wolf management, human dimensions, conservation social science, wildlife value orientations, ideology

INTRODUCTION

There are numerous and competing constellations of human actors in nearly every wildlife conservation issue, and sometimes this diversity results in conflict over management decisions (Marshall et al., 2007). The issue of wolf (*Canis lupus*) management is particularly ripe for conflict given high interest among many stakeholders with heterogeneous experiences with wolves, wildlife values, and ideologies, among other individual and group differences (Lute and Gore, 2014; Carlson et al., 2020). Understanding the patterns of policy preference among parties affected by decisions related to wolf management is an important part of responsive wildlife governance (Decker et al., 2015). Identity, defined both as the meanings individuals ascribe to the self (Stryker and Burke, 2000) and the roles and categories they occupy in society (Tajfel, 1982), has emerged as a means to

understand heterogeneity in wolf stakeholders' values, beliefs, attitudes and behaviors (Lute et al., 2014; Carlson et al., 2020; van Eeden et al., 2020a,b). Although recent studies have documented the relationship between constituents' identities and their higher order cognitions related to wolves and wolf management (Schroeder et al., 2021), there is much to learn about identity processes in governance. Individuals, for instance, can identify with many categories or labels, each with varying degrees of prominence, salience, and commitment in a given context (Burke and Stets, 2009). Identities may be similar or dissimilar to one another, and there may be similar or dissimilar relationships between different identities and values, beliefs, and attitudes toward wolves and wolf management issues. Different groups of wolf stakeholders may make competing claims to the same identities, complicating normative narratives about stakeholders' positions. Developing an understanding of the inter-relationships among the embodied self-meanings of constituents can aid in mapping the broad array of perspectives on a given topic, and clarify the relative sources of those perspectives. In this study, we used multidimensional scaling (MDS) to explore the relationships among seven putative identities held by stakeholders in wolf management in Minnesota, United States: (a) wolf advocate, (b) hunter, (c) environmentalist, (d) nature enthusiast, (e) farmer, (f) trapper, and (g) conservationist. We then tested the relationships between these identities and individuals' wildlife value orientations, political ideology, trust in the state wildlife management agency (SWMA), and general attitudes toward wolves, to contextualize observed differences. Our analysis contributes to the literature by describing similarities and differences in the identities of wolf stakeholders and situating these identities within the broader nomological network of cognitions pertinent to evaluations of wolves and wolf management. Past studies have shown relationships between social categories like hunter and farmer as determined by *a priori* sampling using survey methods and individuals' attitudes toward wolves, but studies have not examined the relationships between the strength of ones' identification with social identities and other important elements of the hierarchy of cognitions contributing to individuals' evaluations of wolves and wolf policy. This study occurred in the context of the state's effort to update its species management plan. Although the topic is limited to single species in a single state, the broader issue of stakeholder identity is one that transcends many natural resource governance contexts.

Theoretical Framework

Social Identity Theory

Social identity theory provides a foundation to understand differences in stakeholders' attitudes toward wildlife and wildlife management. Social identity theory began as a theory of intergroup relationships (Tajfel and Turner, 1979), but has expanded to examine the role of self and identity related to in-groups and out-groups (Turner et al., 1987). Self-categorization theory (Turner et al., 1987) clarified how people make binary categorizations between the groups they identify with (i.e., in-groups) and groups they do not identify with (i.e., out-groups). Group prototypes are idealized members of a group. The group

prototypes are both descriptive and prescriptive in that they model role expectations, and suggest ways that group members should think, feel, and act (Hornsey, 2008).

Social identities guide peoples' values, ideologies, attitudes, and beliefs (Tajfel and Turner, 1986; Turner et al., 1994; Onorato and Turner, 2004; Mayer and O'Connor Shelley, 2018). Social identity and self-categorization offer theoretically plausible explanations for observed differences in attitudes among individuals who identify with different groups (Unsworth and Fielding, 2014). Research has demonstrated a relationship between stakeholder groups, and their attitudes about wolf management (Lute and Gore, 2014; von Essen and Hansen, 2015; Landon et al., 2018). With some exceptions (e.g., Bruskotter et al., 2019; van Eeden et al., 2019) many previous studies related to wolves have compared the attitudes of stakeholder categories targeted in sample designs (e.g., livestock producers, licensed deer hunters), rather than examine the strength of individuals reported identification with a given role, similarities and differences among different identities, and how those identities influence attitudes toward wildlife and wildlife management (Tucker and Pletscher, 1989; Ericsson and Heberlein, 2003; Landon et al., 2018). Studies examining attitudes and consensus about management of carnivores have also documented high levels of disagreement within stakeholder groups (Metcalf et al., 2017), suggesting that further research is needed to understand both individual and group level identities. Looking at self-reported strengths of various identities among individuals, rather than *a priori* stakeholder group membership, may enhance understanding of the diversity of perspectives on wolf management and their relative sources.

Research in the European context has also found evidence for the role of identity in shaping individuals' positions on wolves and wolf management, sometimes with conflicting results. Bongi et al. (2022) found that among residents in northwest Italy, conservationists and hunters held much more positive views of wolves than did farmers, and this relationship held irrespective of exposure. Skogen and colleagues (Skogen and Krangle, 2003; Skogen et al., 2008), described how negative perceptions toward wolves may be shaped by social processes in rural Norway and France. Similarly, Heberlein and Ericsson (2005) demonstrated place effects on Swedes' attitudes toward wolves. Interestingly, and in contradiction to findings in the United States (Williams et al., 2002), Heberlein and Ericsson (2005) found that urban residents that lacked a tie to the countryside held the least positive attitudes toward wolves compared to rural or urban residents that engaged in nature-based recreation. While not identity per se, one's place of residence correlates with values and ideologies reflective of heterogeneous identities (Creswell, 1996). The positions of Swedish stakeholders have not remained static overtime. Hunters were supporters of wolves in Scandinavia during the early part of reintroduction, but support has declined the longer hunters have coexisted with wolves (Ericsson and Heberlein, 2003; Dressel et al., 2014). Numerous studies on wolves in Europe highlight the complex social dynamics of living with wolves. Nilsson et al. (2020) highlight the dynamic nature of coalitions of wolf advocates and opponents in Sweden.

These authors examined an alternate conceptualization of coalitions of humans drawing on both social identity theory and the advocacy coalition framework, to show that belief-based coalitions may offer greater explanatory power regarding stakeholder perspectives on wolves than identities per se. These results suggest some overlap in the beliefs of groups of humans defined by role identities, but that identities and beliefs are mutually constitutive elements of one's self-concept. von Essen and Hansen (2015) further demonstrate how stakeholder dynamics, especially as it relates to classifications of individuals into groups, potentially serve to reify existing conflict and exacerbate identity-based evaluations of management problems and solutions.

Wildlife Value Orientation

Wildlife value orientations (WVO) are basic beliefs that characterize individuals' and groups' convictions about humans' relationship with wildlife. A long-term research program (Fulton et al., 1996; Manfredo et al., 2009, 2020) has operationalized WVOs along two dimensions referred to as domination and mutualism (Teel and Manfredo, 2009; Manfredo et al., 2017). Domination reflects beliefs that humans have mastery over wildlife, human well-being has priority over that of wildlife, and that wildlife exists to benefit humans. Mutualism represents beliefs that humans are meant to coexist in harmonious relationships with wildlife, and that wildlife have rights similar to humans. The strength of individuals' agreement with measures of mutualism and domination have been found to correlate with wildlife-related attitudes and behaviors (Teel and Manfredo, 2009). Previous research findings also indicate cultural level patterns of variance in WVOs, stemming from predictions of modernization theory (Manfredo et al., 2020; Jacobs et al., 2022).

Several recent studies have incorporated both social identity theory and WVOs to examine how personal values and group identity affect attitudes about wildlife management (Heeren et al., 2017; Landon et al., 2018; Bruskotter et al., 2019). Bruskotter et al. (2019) found identification with groups (i.e., farmer, environmentalist, hunter, gun rights advocate, animal rights advocate) correlated with WVOs. Heeren et al. (2017) found identity and WVO influenced attitudes among wildlife professionals. Landon et al. (2018) found stakeholder group (i.e., public versus agricultural producer) and WVOs predicted attitudes about recolonization of predators in Illinois, United States. Individuals with utilitarian beliefs about wildlife (traditionalist orientation) and agricultural producers were found to exhibit the most negative attitudes, while individuals who believed that wildlife have intrinsic rights (mutualist orientation) and members of the general public had more positive attitudes (Landon et al., 2018). This research suggests that group identity and WVOs correlate, but additional work could clarify the relationships between identity, WVOs, and attitudes about wildlife and wolves specifically. This paper will extend correlation analyses with mediation analysis to examine whether WVOs mediate relationships between identity and attitudes toward wolves. Mediation analysis provides a means to understand the process that underlies observed relationships between independent (i.e., predictor)

and dependent (i.e., criterion) variables via the inclusion of a third mediator variable (Baron and Kenny, 1986; MacKinnon, 2011).

Political Ideology

The terms liberal and conservative arguably are motivated social cognitions that characterize political ideology across cultures (Jost et al., 2003). Jost (2006) and Jost et al. (2003) identified core dimensions differentiating liberals and conservatives: (a) attitudes toward inequality, and (b) attitudes toward social change versus tradition. The concept of political ideology is often captured with liberal-conservative or left-right scales in quantitative analysis (Mayer and O'Connor Shelley, 2018). This study examines political ideological identification along the scale ranging from liberal to conservative (Petrocik, 2009). Our use of the terms "liberal" and "conservative" is consistent with the operationalization of political ideology in the United States, and our results are specific to that national context. Researchers examining these issues in other cultural contexts may consider how members of those cultures interpret political ideology. We measured identification with these labels—or as middle of the road—rather than specifically examining attitudes about positions or values associated with liberals or conservatives (Mason, 2018), or affiliation with a political party. Our analysis explores correlations between identities and political ideology to understand differences among seven identities that may be associated with attitudes about wolves. Recent research (Schroeder et al., 2021) has documented relationships between political ideology and stakeholder groups, and between political ideology and WVOs. Yet, gaps remain in understanding how political ideology relates to stakeholders' identification with roles pertinent to wolves and wolf management.

Agency Trust

Institutional trust reflects the willingness to rely on those with formal responsibility for decision-making and management of public resources and risks (Siegrist et al., 2000), and often represents the trust relationship between stakeholders and an institution (Winter and Cvetkovich, 2010; Zajac et al., 2012; Smith et al., 2013). In an attempt to understand the origins of trust, researchers have tested numerous antecedents of trust (Needham and Vaske, 2008; Schroeder and Fulton, 2017; Riley et al., 2018). One hypothesis regarding the source of trust is salient values similarity (Siegrist et al., 2000). Several studies about constituents' trust in natural resource management institutions has operationalized institutional trust as shared values between constituents and an agency (Cvetkovich and Winter, 2003; Winter and Cvetkovich, 2010). Shared goals, values, and opinions (i.e., perceived similarity) are hypothesized foundations of institutional trust (Siegrist et al., 2000; Cvetkovich and Winter, 2003; Needham and Vaske, 2008). Beyond shared values, research has demonstrated the influence of process, outcomes, and technical competence on institutional trust (Poortinga and Pidgeon, 2003; Van Ryzin, 2011), and these concepts are examined in the trust literature related to natural resource management (Schroeder and Fulton, 2017; Riley et al., 2018).

Numerous researchers have explored the role of trust in the management of large carnivores, including wolves. Söjlander-Linquist et al. (2015) conceptualize the legitimacy of aspects of governance as a function of myriad individual and collective responses embedded in dynamic bio-physical, socio-cultural, and institutional contexts. These authors suggest that trust is “crucial for large carnivore management” (p. 180), and that a lack of trust can further exacerbate individual appraisals of risk and fear, and shape attitudes toward management (Johansson et al., 2012, 2016). Skogen and Krange (2020) argue that a mistrust of environmental institutions underpinned Norwegian hunters’ acceptance of illegal wolf killings, among other variables. Documenting the positive effects of trust, Ghasemi et al. (2021) demonstrated that trust in a wildlife management agency could reduce perceived risks from large carnivores including wolves, and increase support for their recovery in a landscape where viable populations of large carnivores do not exist currently. Similarly, Arbieu et al. (2019) found that individuals’ trust in information sources about wolves had a positive effect on their attitudes toward wolves. These results suggest that trust can influence the cognitive evaluations of wolves among individuals that have not had direct experience with wolves.

Trust, however, is a function of both direct experience with individuals and groups whom bear responsibility for shared resources, and broad patterns of values consistent with social identity processes and other cultural dimensions. Krange et al. (2021) provide evidence for this assertion in their investigation of Norwegian stakeholders’ beliefs about the anthropogenic cause of climate change. They found that trust influenced climate change beliefs directly, but that beliefs about nature in general and indicators of right wing populism including ant-elitism and beliefs about immigrants, partially mediated the effect. Other scholars have documented decline in social trust among Americans following value shift, with implications for collaborative governance of natural resources (Rahn and Transue, 2002).

Trust in government varies by political ideology, values, and stakeholder group, and, for this reason, examining trust may help clarify differences among identities associated with wolves. Political ideology consistently predicts trust of government in the United States, with conservatives more trusting of the private sector and liberals more trusting of government (Cacciatore et al., 2018). Research has also found stakeholder group, WVO, and political ideology to predict trust in a SWMA (Schroeder et al., 2021). Manfredo et al. (2017) examined relationships between WVOs and trust in SWMAs, finding that residents with domination values were less trusting of SWMAs. Similarly, Gigliotti et al. (2020) found utilitarian landowners less trusting of a SWMA. Our study examined similarities and differences in trust related to self-reported strengths of identities associated with wildlife management.

Scholars and wildlife managers have examined the role of several individual and group identities in wolf management. In this study, we limited our analysis to a subset of identities associated with individuals and groups engaged in discourse about wolves and wolf management including; wolf advocate,

hunter, environmentalist, nature enthusiast, farmer, trapper, and conservationist.

Study Hypotheses

We offer the following hypotheses regarding the relationships between wolf stakeholders’ identities, WVOs, and trust in the SWMA. We did not establish *a priori* hypotheses regarding the relationships between identity and political ideology.

H1. Identities will correlate with WVOs.

H2. Identities will correlate with attitudes about wolves. Farmer and hunter identities are expected to correlate with negative attitudes.

H3. Domination WVO will correlate with negative attitudes about wolves.

H4. Mutualism WVO will correlate with positive attitudes about wolves.

H5. Domination WVO will negatively correlate with trust in the SWMA.

H6. Mutualism WVO will positively correlate with trust in the SWMA.

MATERIALS AND METHODS

Study Context

Minnesota began revision to the state wolf plan in 2019 prior to recent federal wolf policy decisions. Regardless of the status of wolves under the U.S. Endangered Species Act (16 United States Code Sections 1531–1544), it is necessary to possess data regarding constituents’ values, beliefs, attitudes and behaviors toward wolves. It is under this context that the Minnesota Department of Natural Resources (DNR) and the University of Minnesota (Twin Cities) collaborated to conduct a survey of Minnesota wolf stakeholders described in the section to follow. Since collection of the data presented in this study, wolves have since been removed from and placed back under protection afforded by the ESA. In November 2020—more than 45 years after they were first listed under the ESA—gray wolves were delisted (United States Fish and Wildlife Service [USFWS], 2020). Beginning in 2021, state and tribal wildlife managers resumed responsibility for management and protection of gray wolves, with monitoring by the U.S. Fish and Wildlife Service for 5 years to ensure the continued success of the species (United States Fish and Wildlife Service [USFWS], 2020). State and tribal authority was short lived, when a federal court ruling placed wolves back on the ESA in February 2022 (Defenders of Wildlife et al. v. U.S. Fish and Wildlife Service et al., 2022).

Sampling

The populations of interest in this study included (a) Minnesota residents, (b) Minnesota resident deer hunters, and (c) livestock producers (individuals who farm cattle and sheep) in the state’s wolf range. In each case, samples were drawn of individuals

18 years and older. We purchased the sample of state residents from Marketing Systems Group who derived the sample from postal addresses. The sampling frame used to draw the sample of deer hunters was the Minnesota DNR's electronic licensing system. We obtained the sample of livestock producers from the state Board of Animal Health.¹ We distributed questionnaires to 5,250 residents, 2,000 deer hunters, and 2,500 livestock producers.

Data Collection, Response Rate, and Nonresponse Check

Data were collected by researchers at the University of Minnesota (Twin Cities) for the Minnesota DNR using mail-back questionnaires following a process outlined by Dillman et al. (2014) to enhance response rates. Personalized cover letters, surveys, and business-reply envelopes were mailed to potential study participants between September and December 2019. In order to examine nonresponse bias, we examined mailing wave differences in stakeholder identities and respondent age. This assessment of nonresponse bias reflects extrapolation methods, which are based on the assumption that subjects who respond less readily resemble non-respondents (Armstrong and Overton, 1977). We did not observe meaningful differences in identities or age by survey response wave [Effect size (η^2) of ANOVA by wave < 0.00].

Of the 9,750 total questionnaires mailed, 1,059 were undeliverable and an additional 170 were unusable (i.e., deceased, non-resident, etc.). Of the remaining 8,521 questionnaires, a total of 3,500 questionnaires were returned for a response rate of 41.1%. The effective response rates for the three research strata were: 46.6% for hunters, 32.8% for the general public, and 53.4% for livestock producers. In order to provide accurate population estimates for the resident sample, we compared our respondents to demographic information available through the U.S. Census Bureau (2010) and known rates of hunting participation derived from SWMA license records. The resident sample was drawn using a stratified random sample within SWMA management regions defining the study strata. Data were weighted to reflect the proportion of the population in the different regions within cells representing two categories of hunter status, two categories of gender, and five categories of age (18–39, 40–49, 50–59, 60–69, and 70+).

Measurement

Questions included in the analysis presented in this paper were a subset of those included in the study questionnaire. The analysis presented in this paper focused on respondents' self-reported identity, political ideology, WVOs, agency trust, and attitudes about wolves. Respondents rated how much they identified with seven labels including: (a) wolf advocate, (b) hunter, (c) environmentalist, (d) nature enthusiast, (e) farmer, (f) trapper, and (g) conservationist. Identity was rated on a 5-point scale ranging from 1 (not at all like me) to 5 (very much like me). Political ideology was rated on a 7-point scale ranging from very liberal to very conservative. We measured WVOs using

22 items and scales derived from Manfredo et al. (2009, 2017; **Appendix A**), and trust using 17 items and scales derived from Riley et al. (2018) and Schroeder et al. (2020; **Appendix B**). WVOs and agency trust were both measured using 7-point Likert scales ranging from strongly disagree to strongly agree. Attitudes were measured using four 7-point semantic differential scales anchored by the words dangerous-harmless, bad-good, harmful-beneficial, and negative-positive, which were used in an equal-weighted scale.

Analysis

We conducted several analyses to examine respondent identity, and to look at how identity correlated with trust, WVOs, political ideology and attitudes toward wolves. First, we employed multidimensional scaling to visualize relationships among the seven identities. Next, we conducted an exploratory factor analysis (EFA) using principal components analysis with varimax rotation, and extraction based on eigenvalues greater than 1.0. Then, we conducted bivariate correlations between identities, political ideology, mutualism and domination WVOs, agency trust, and wolf attitudes. We interpret correlations using Cohen's (1988) definitions of small (0.10), medium (0.30), and large (0.50) effect sizes. Finally, we conducted mediation analysis using multiple regression analysis. Data were analyzed using the Statistical Program for the Social Sciences (SPSS 27) and Stata (StataCorp, 2019).

Multidimensional Scaling

MDS creates a map displaying the relative positions of a number of objects, given a table of the distances between them referred to as a proximity matrix (Davison and Sireci, 2000). The map may consist of one, two, three, or even more dimensions. MDS techniques prove useful in circumstances where the actual coordinates of objects are not known, but some type of distance matrix is available. This is especially the case in psychology where people may not be able to draw an overall picture of a group of objects, but they can express how different individual pairs of objects are (NCSS, 2021). Stress values provide measures of goodness of fit in MDS, with the following fit levels: 0.000 (perfect), 0.025 (excellent), 0.050 (good), 0.100 (fair), and 0.200 (poor; Kruskal, 1964). A scree plot of stress values is often used to determine the number of dimensions to include (Kruskal and Wish, 1978). If the addition of a dimension provides little improvement in the stress value, it is unlikely the additional dimension is needed (Davison and Sireci, 2000). The MDS map is the chief outcome of MDS analysis, and interpretation of results in the map is largely subjective although external data can be used to help interpret the solution (Davison and Sireci, 2000).

Mediation Analysis

We conducted mediation analysis based on the three-step process described by Baron and Kenny (1986): (1) regress the mediators on the predictor (i.e., independent) variable, (2) regress the criterion (i.e., dependent) variable on the independent variable, and (3) regress the dependent variable on both the predictor and the mediator. Therefore, in the mediation analysis examining wolf attitudes, the three steps were to: (1) regress WVOs on

¹<https://www.bah.state.mn.us>

the identities, (2) regress attitudes about wolves on identities, and (3) regress attitudes about wolves on both identities and WVOs. Separate coefficients were estimated for each equation. Mediation is found when the following three conditions occur: (1) the predictor affects the mediator variable, (2) predictor affects the criterion variable, and (3) the mediator affects the criterion variable in the third equation. If these conditions all hold in the predicted direction, then the effect of the predictor on the criterion variable must be less in the third equation than in the second. Full mediation holds if the predictor variable has no effect on the criterion variable, and partial mediation occurs if the predictor variable has a reduced effect on the criterion variable. We provide results from the Sobel test for mediator variables in the final regression analyses. The Sobel test provides a method to test the statistical significance of the reduction in the effect of the independent variable on the dependent variable after including the mediator in the model (Baron and Kenny, 1986). We estimated regression models in Stata version 16 (StataCorp, 2019), and used to the *rwolf* package to derive Romano-Wolf stepped-down *p*-values for multiple comparisons in order to control for familywise error (Clarke, 2016).

RESULTS

First, we employed MDS to explore relationships among identities. We used a scree test to determine the number of dimensions. The stress level dropped from 0.102 for one dimension to 0.003 for two dimensions, which provided a parsimonious description of the data. MDS suggested similarities among environmentalists, conservationists, and

nature enthusiasts, and diversity among the other identities (i.e., hunters, farmers, trappers and wolf advocates; **Figure 1**). EFA suggested a two-dimensional solution with identities suggestive of benefits from wild wolves (i.e., environmentalist, nature enthusiast, conservationist, and wolf advocate) on the first factor and identities suggestive of costs from wild wolves (i.e., hunters, farmers, and trappers) on the other (**Table 1**).

Correlation analyses helped clarify the similarities and differences among identities. Bivariate correlations among the identities reinforce similarities among environmentalists, conservationists, and nature enthusiasts found in both the MDS and EFA (**Table 2**). Consistent with the EFA, identity as a wolf advocate was positively correlated with the environmentalist, conservationist, and nature enthusiast identities with medium to large effect sizes. Reflective of the MDS, environmentalist, conservationist, and nature enthusiast identities were correlated with large effect sizes. Also consistent with the MDS and EFA, we found hunter, farmer, and trapper identities were positively correlated with each other, with medium to large effect sizes. A conservationist identity was positively correlated with all six other identities; the effect size was large for environmentalists and nature enthusiasts, medium for wolf advocates, and small for hunters, farmers, and trappers.

Next, we looked at correlations between identities, with political ideology, trust in the SWMA, wildlife value orientations, and attitudes about wolves (**Table 3**). Environmentalists and wolf advocates reported the most liberal political ideologies with medium effect sizes, and hunters were the most conservative politically with a medium to large effect size. Conservationist identity was closest to neutral in political ideology, being slightly conservative with a small effect size. Wolf advocate identity was most strongly positively correlated with measures of trust in the SWMA, while farmer identity was most strongly negatively correlated with trust measures, with medium effect sizes. A wolf advocate identity was most positively correlated with mutualism and most negatively correlated with the domination wildlife value orientation, both with medium to large effect sizes. Hunter identity was most positively correlated with domination with a large effect size, and most negatively correlated with mutualism with a medium effect size. Wolf advocate was most strongly correlated with positive attitudes toward wolves with a large effect size, and farmer most strongly correlated with negative attitudes with a medium to

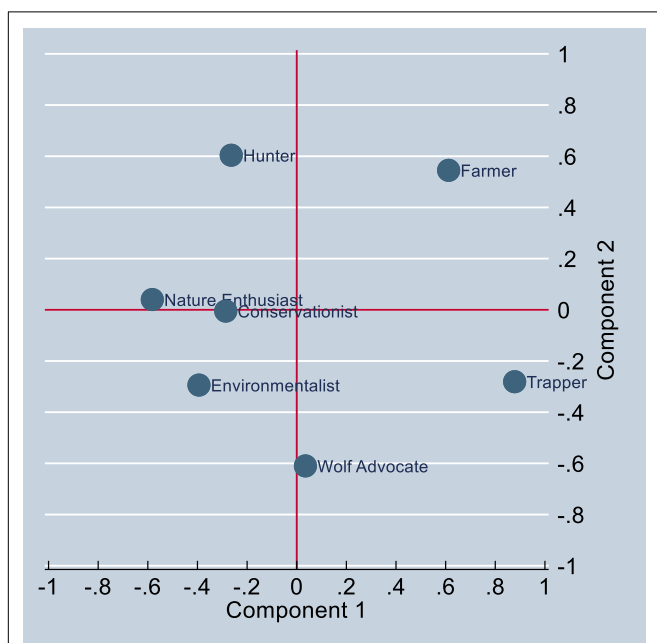


FIGURE 1 | Multidimensional scaling of putative identities of wolf stakeholders in Minnesota, United States.

TABLE 1 | Principal component analysis of putative identity of wolf stakeholders in Minnesota, United States: Rotated component matrix (varimax rotation with Kaiser normalization).

	Component 1 "Pro-wolf"	Component 2 "Anti-wolf"
Wolf advocate	0.653	-0.384
Hunter	0.082	0.782
Environmentalist	0.875	-0.059
Nature enthusiast	0.845	0.002
Farmer	-0.101	0.741
Trapper	-0.008	0.808
Conservationist	0.823	0.231

large effect size. Conservationist identity was closest to neutral attitudes, but on the positive side with a small to medium effect size.

Results from mediation analysis found most identities and domination WVO influential on attitudes about wolves (Tables 4, 5). Results suggested that domination partially mediated the relationships between five of seven identities and attitudes. Mutualism did not mediate the relationships between identity and attitudes (Table 6).

DISCUSSION

We found support for all of our hypotheses. These results reflect expected relationships between identities with WVOs and attitudes about wolves. They also support expected

relationships between WVOs and attitudes about wolves and trust in the SWMA.

Understanding Identities That May Be Associated With Wolf Management

Our work helps distinguish among various identities to enhance understanding of diverse perspectives on wolves. Among identities that associated benefits with wild wolves, we found strong similarities among the identities of environmentalists, nature enthusiasts, and conservationists. The wolf advocate identity was also aligned with these three identities but differed from them by having more positive correlations with mutualism, trust in the SWMA, and attitudes about wolves. Results suggest that wolf advocates tend to be more liberal, more mutualists, and more trusting of the SWMA. This finding supports previous research documenting

TABLE 2 | Bivariate correlations among identities for wolf stakeholders in Minnesota, United States.

	Wolf advocate	Hunter	Environmentalist	Nature enthusiast	Farmer	Trapper	Conservationist
Wolf advocate	1						
Hunter	-0.220**	1					
Environmentalist	0.500**	-0.001	1				
Nature enthusiast	0.420**	0.103**	0.652**	1			
Farmer	-0.272**	0.355**	-0.107**	-0.119**	1		
Trapper	-0.197**	0.492**	-0.069**	-0.043*	0.441**	1	
Conservationist	0.355**	0.162**	0.629**	0.588**	0.091**	0.133**	1

** $p < 0.001$, * $p < 0.05$.

TABLE 3 | Bivariate correlations of identities with political ideology and trust in the state wildlife management agency for wolf stakeholders in Minnesota, United States.

	Political ideology	Process	Outcomes	Trust	Social values similarity	Technical competence	Mutualism	Domination	Attitudes
Wolf advocate	-0.297	0.343	0.354	0.333	0.366	0.305	0.482	-0.412	0.623
Hunter	0.371	-0.251	-0.266	-0.241	-0.159	-0.177	-0.288	0.547	-0.382
Environmentalist	-0.300	0.205	0.218	0.210	0.254	0.229	0.376	-0.247	0.347
Nature enthusiast	0.136	0.168	0.175	0.178	0.242	0.199	0.292	-0.134	0.292
Farmer	0.280	-0.344	-0.325	-0.325	-0.298	-0.243	-0.159	0.337	-0.457
Trapper	0.251	-0.279	-0.285	-0.270	-0.232	-0.216	-0.194	0.351	-0.352
Conservationist	-0.088	0.093	0.093	0.093	0.172	0.146	0.277	-0.064	0.169

All correlations $p < 0.001$.

TABLE 4 | Bivariate correlations among political orientation, wildlife value orientations, and trust in the state wildlife management agency for wolf stakeholders in Minnesota, United States.

	Political ideology	Process	Outcomes	Trust	Social values similarity	Technical competence	Mutualism	Domination	Attitudes
Political ideology	1								
Process	-0.219	1							
Outcomes	-0.248	0.902	1						
Trust	-0.224	0.935	0.941	1					
Social values similarity	-0.211	0.796	0.803	0.812	1				
Technical competence	-0.199	0.710	0.749	0.742	0.682	1			
Mutualism	-0.350	0.213	0.216	0.200	0.248	0.208	1		
Domination	0.481	-0.210	-0.224	-0.199	-0.174	-0.159	-0.479	1	
Attitudes	-0.392	0.427	0.433	0.419	0.415	0.363	0.384	-0.493	1

All correlations $p < 0.001$.

TABLE 5 | Summary of regression mediation analyses examining of how identities and wildlife value orientations predict attitudes about wolves for wolf stakeholders in Minnesota, United States.

	<i>B</i>	<i>SE B</i>	β	<i>T</i>	<i>Model p</i>	<i>Romano-Wolf p</i> ⁴
Regression 1: predictor and mediators¹						
WA→DOM	-0.167	0.014	-0.212	-11.89	<0.001	0.001
HUNT→DOM	0.266	0.010	0.443	25.48	<0.001	0.001
ENV→DOM	-0.098	0.017	-0.125	-5.71	<0.001	0.001
NE→DOM	0.005	0.017	0.001	0.03	0.974	0.978
FARM→DOM	0.044	0.010	0.075	4.46	<0.001	0.002
TRAP→DOM	0.043	0.014	0.053	3.00	0.003	0.012
CONS→DOM	0.015	0.016	0.019	0.94	0.347	0.502
WA→MUT	0.308	0.019	0.307	16.17	<0.001	0.001
HUNT→MUT	-0.190	0.014	-0.249	-13.38	<0.001	0.001
ENV→MUT	0.131	0.023	0.138	5.58	<0.001	0.001
NE→MUT	0.067	0.024	0.062	2.84	0.005	0.068
FARM→MUT	0.036	0.014	0.048	2.64	0.008	0.028
TRAP→MUT	-0.037	0.019	-0.035	-1.87	0.061	0.105
CONS→MUT	0.092	0.022	0.091	4.13	<0.001	0.007
Regression 2: predictor and criterion²						
WA→ATTS	0.576	0.020	0.456	28.42	<0.001	0.001
HUNT→ATTS	-0.166	0.015	-0.174	-11.01	<0.001	0.001
ENV→ATTS	0.078	0.024	0.062	3.16	0.002	0.006
NE→ATTS	0.068	0.025	0.050	2.71	0.007	0.022
FARM→ATTS	-0.218	0.014	-0.232	-15.20	<0.001	0.001
TRAP→ATTS	-0.096	0.021	-0.073	-4.54	<0.001	0.001
CONS→ATTS	-0.011	0.023	-0.009	-0.48	0.630	0.686
Regression 3: predictor, mediators, criterion³						
WA→ATTS	0.529	0.021	0.420	24.14	<0.001	0.001
HUNT→ATTS	-0.116	0.017	-0.122	-6.78	<0.001	0.001
ENV→ATTS	0.057	0.026	0.045	2.19	0.028	0.061
NE→ATTS	0.079	0.026	0.059	3.06	0.002	0.010
FARM→ATTS	-0.209	0.015	-0.221	-14.02	<0.001	0.001
TRAP→ATTS	-0.080	0.022	-0.060	-3.69	<0.001	0.001
CONS→ATTS	-0.016	0.024	-0.013	-0.67	0.503	0.580
DOM→ATTS	-0.209	0.029	-0.132	-7.21	<0.001	0.001
MUT→ATTS	0.026	0.022	0.020	1.19	0.234	0.357

WA, wolf advocate; HUNT, hunter; ENV, environmentalist; NE, nature enthusiast; FARM, farmer; TRAP, trapper; CONS, conservationist; DOM, domination; MUT, mutualism; ATTS, attitudes about wolves.

¹Adj. R^2 : 0.397 (DOM); 0.313 (MUT).

²Adj. R^2 : 0.520.

³Adj. R^2 : 0.540.

⁴Corrected *p*-values control for the family-wise error rate, using the *r*wolf package in Stata (Clarke, 2016). Bootstrapped with 1,000 draws.

similar, close interrelationships among identity, values, political ideology, and trust in government (Bright et al., 2000; Manfredo et al., 2017; Cacciatore et al., 2018; Schroeder et al., 2021).

Although we identified similarities among environmentalists, nature enthusiasts, and conservationists, we found the conservationist identity to be more centrist in terms of their political ideology, WVOs, trust in the agency, and attitudes about wolves. This finding may reflect the association of the term conservationist with hunting and angling (Holsman, 2000; Snyder et al., 2021), and that Gifford Pinchot's definition of conservation suggested the "wise use of the earth and its resources for the lasting good of men" (United States Department of the

Interior [USDOI], 2021). A conservationist identity may resonate with a broader constituency because of its roots in the progressive conservation movement at the end of the 19th century (Mertig, 2015). This movement was narrowly focused on conservation of local wildlife and scenic areas, rather than the broader concerns of the modern environmental movement, which incorporates concerns about pollution, biodiversity, and climate change (Mertig, 2015). It is somewhat surprising that the conservationist identity did not have a stronger correlation with trust in the SWMA in this study. However, our results suggest that some individuals may not perceive strong differences between conservationist and environmentalist identities suggesting the definition of conservationist may be shifting over time.

TABLE 6 | Sobel test results.

Mediator - predictor	Sobel test	P
DOM		
- WA	5.456	<0.001
- HUNT	6.039	<0.001
- ENV	4.502	<0.001
- NE	0.294	0.769
- FARM	3.755	<0.001
- TRAP	2.825	0.004
- CONS	0.929	0.353
MUT		
- WA	1.179	0.239
- HUNT	1.177	0.239
- ENV	1.157	0.247
- NE	1.089	0.276
- FARM	1.074	0.282
- TRAP	1.010	0.312
- CONS	1.141	0.254

WA, wolf advocate; HUNT, hunter; ENV, environmentalist; NE, nature enthusiast; FARM, farmer; TRAP, trapper; CONS, conservationist; DOM, domination; MUT, mutualism.

We found less similarity among the identities that associate costs with wild wolves. The hunting identity was more strongly correlated with a conservative political ideology and a domination WVO, while the farmer identity was more strongly correlated with distrust in the SWMA and negative attitudes about wolves. Although hunters, trappers, and farmers may on average share negative attitudes about wolves, they differ in their trust in the management agency, political ideology and WVOs. Perhaps farmers interact with the SWMA less than hunters and trappers or in more antagonistic ways (e.g., denied wildlife damage claims), which leads to reduced trust (Gigliotti et al., 2020). Hunters and trappers may have more interaction with SWMA staff, or perceived greater salient values similarity with the agency (Gigliotti et al., 2020). Despite similarities in trust in the SWMA between hunters and trappers, trappers reported lower levels of political conservatism and domination compared to hunters. Previous work has suggested that trappers may think of themselves as part of nature or as fulfilling a stewardship function by controlling nuisance or problem animals and controlling the spread of wildlife disease (Daigle et al., 1998), and this may provide some explanation for a somewhat unexpected result.

Identity and Values as Predictors of Attitudes About Wolves

Our analyses demonstrate the importance of the domination WVO as a predictor of attitudes about wolves. Domination was more strongly correlated with attitudes about wolves than mutualism, which is in contrast to other published studies (Bruskotter et al., 2017). In addition, domination—but not mutualism—partially mediated the relationship between identity and wolf attitudes. Previous studies have found both domination

and mutualism to predict wildlife-related attitudes and behaviors (Teel and Manfredro, 2009). In the context of identities and attitudes about wolves, the influence of domination may reflect the symbolic nature of the animal and what wolves can represent (Wilson, 1997; Bruskotter and Fulton, 2012). Among hunters, ranchers, and other individuals, wolves may represent a threat to desired game species and livestock (Treves, 2009; Bruskotter and Wilson, 2014; Hogberg et al., 2015; Schroeder et al., 2018). Beyond this, the presence of wolves may reflect loss of social power, property rights, and a utilitarian landscape (Wilson, 1997) for some individuals (Skogen and Krange, 2003; Skogen et al., 2008).

This study provides a step in exploring how identities may relate to attitudes about wolves. Our work is somewhat limited by the fact that we derived our data from a study related to wolf management, and response to our survey measurement items addressing identity and other social psychological constructs was influenced by this context. Additional work could explore the similarities and differences of these identities, and how the identities correlate with attitudes, values, and trust, in the context of other topics. Future research could clarify conservationist, environmentalist, nature enthusiast, and animal advocate identities, and how these identities relate to WVOs, trust in government, and attitudes about wildlife management. Psychological constructs found to explain patterns of policy preference like social dominance orientation (Pratto et al., 1994; Ho et al., 2015) and right-wing authoritarianism (Altemeyer, 1981, 1996) may also relate to identities associated with wildlife management issues and may be worthy of further consideration (Sinn, 2019). In addition, inclusion of other cognitive measures such as perceptions of risks and benefits of wildlife species that might mediate the relationship between identity and WVOs could also help clarify relationships among constructs (Bruskotter and Wilson, 2014).

Despite study results showing that liberal political ideology and mutualist WVO correlated with increased trust in SWMAs, little published research exists on the actual values and WVOs of SWMA professionals (Muth et al., 2006; Gamborg et al., 2019). Very limited research on SWMA staff suggests that their values may align more closely with those of traditional stakeholder groups (Muth et al., 2006). However, a study of wildlife management students (pre-professional) found a majority were mutualists, which may reflect changes in WVOs observed in larger society (Manfredro et al., 2003). In addition, given the relative difference in the domination WVO observed between hunters and trappers, work might examine WVOs among different consumptive recreation participants including hunters and trappers targeting different species, as well as anglers. Future research could replicate our analysis to examine how domination versus mutualism mediate relationships between identities and attitudes or behaviors in other wildlife and natural resource management contexts. Our results underscored domination, rather than mutualism, as a correlate of attitudes about wolves, but research is needed to clarify how WVOs interact with identity related to other potentially less symbolic wildlife species. This finding is especially important for identities that a wider swath of society have internalized, like conservationist.

Our results provide some insight for managers when working with multiple stakeholders in wolf management. We found strong similarities among environmentalists, nature enthusiasts, and conservationists, but clarified that a conservationist identity was correlated with all identities, including hunter, trapper, and farmer identities. This finding suggests that management communications that emphasize a conservationist, rather than an environmentalist or sportsperson perspective may garner support from a broader constituency and encourage trust in agency actions. However, conflicting attitudes about wolves, and the importance of a domination WVO to attitudes, may present a challenge to building consensus on wolf management.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by University of Minnesota Institutional Review

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Board. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

SS collected the data, conducted the analysis, and wrote portions of the manuscript. AL conceived the idea and wrote portions of the manuscript. DF edited the manuscript and provided support for the hypotheses. LM edited the manuscript and provided support for the hypotheses. All authors contributed to the article and approved the submitted version.

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APPENDIX A

TABLE A1 | Wildlife value orientation survey items adapted from Teel and Manfredi (2009)¹.

Factor - Items	Cronbach's Alpha
Domination value orientation - Humans should manage fish and wildlife populations so that humans benefit. - The needs of humans should take priority over fish and wildlife protection. - It is acceptable for people to kill wildlife if they think it poses a threat to their life. - It is acceptable for people to kill wildlife if they think it poses a threat to their property. - It is acceptable to use fish and wildlife in research even if it may harm or kill some animals. - Fish and wildlife are on earth primarily for people to use. - We should strive for a world where there's an abundance of fish and wildlife for hunting and fishing. - Hunting is cruel and inhumane to the animals. ² - Hunting does not respect the lives of animals. ² - People who want to hunt should be provided the opportunity to do so.	0.801
Mutualism value orientation - We should strive for a world where humans and fish and wildlife can live side by side without fear. - I view all living things as part of one big family. - Animals should have rights similar to the rights of humans. - Wildlife are like my family and I want to protect them. - I care about animals as much as I do other people. - It would be more rewarding to me to help animals rather than people. - I take great comfort in the relationships I have with animals. - I feel a strong emotional bond with animals. - I value the sense of companionship I receive from animals.	0.879

¹Items were measured on a scale ranging from 1 (strongly disagree) to 7 (strongly agree).

²Item was reverse-coded prior to analysis.

APPENDIX B

TABLE B1 | Trust survey items adapted from Riley et al. (2018) and Schroeder et al. (2020)¹.

Factor - Items	Cronbach's Alpha
Process	0.926
- Is open and honest about things they do and say related to wildlife management.	
- Will make decisions about wildlife management in a way that is fair.	
- Listens to the concerns of citizens.	
Outcomes	0.931
- Does a good job of managing wildlife in Minnesota.	
- Spends public money effectively.	
- Adequately manages Minnesota's wildlife	
Trust	0.949
- Can be trusted to make decisions about that wildlife management are good for the resource.	
- Can be trusted to take responsibility for managing Minnesota's wildlife resources.	
- Is trustworthy.	
Social values similarity	0.971
- Shares similar values as me.	
- Shares similar opinions as me.	
- Thinks in a similar way as me.	
- Takes similar actions as I would.	
- Shares similar goals as me.	
Technical competence	0.955
- Has wildlife managers and biologists who are well-trained for their jobs.	
- Is operated by employees who are well-qualified	
- Is operated by employees who understand the work that needs to be done	

¹ Items were measured on a scale ranging from 1 (strongly disagree) to 7 (strongly agree).