

Are Gray Wolves Endangered in the Northern Rocky Mountains? A Role for Social Science in Listing Determinations

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Conservation scientists increasingly recognize the need to incorporate the social sciences into policy decisions. In practice, however, considerable challenges to integrating the social and natural sciences remain. In this article, we review the US Fish and Wildlife Service's (FWS) 2009 decision to remove the northern Rocky Mountain population of gray wolves from the federal list of endangered species. We examine the FWS's arguments concerning the threat posed by humans' attitudes toward wolves in light of the existing social science literature. Our analysis found support for only one of four arguments underlying the FWS's assessment of public attitudes as a potential threat to wolves. Although we found an extensive literature on attitudes toward wolves, the FWS cited just one empirical research article. We conclude that when listing decisions rest on assumptions about society, these assumptions should be evaluated using the best available natural and social science research.

Keywords: Endangered Species Act, listing determination, wolves, social sciences, conservation policy

In recent years, several authors have called for greater integration of the social and natural sciences in conservation-related decisions (e.g., Jacobson and McDuff 1998, Mascia et al. 2003, Adams 2007). These authors point out that although conservation issues are composed of both natural (e.g., the ecology of systems) and social components (e.g., the policies that guide decisionmaking), most conservation practitioners receive limited training in the social sciences (Jacobson and McDuff 1998). This condition is reflected in conservation decisions, in which biological elements are emphasized with minimal, if any, social science contributions. Yet as Mascia and colleagues (2003) noted, the success or failure of programs is often determined primarily by social factors. In this article we review the April 2009 decision by the US Fish and Wildlife Service (FWS) to remove the northern Rocky Mountain (NRM) population of gray wolves (*Canis lupus*) from protection under the US Endangered Species Act (ESA). This decision provides an opportunity to examine the degree to which the social sciences were integrated into a controversial conservation action with long-recognized human connections.

The reintroduction of gray wolves to the NRM region in 1995–1996 was one of the most politically contentious wildlife management actions in modern history. The effort spanned two decades, involved more than 120 public hearings, and elicited more than 160,000 public comments (Wilson MA 1997). Dozens of special interest groups weighed in on the debate, in which value-laden rhetoric and hyperbole

were pervasive and willingness to compromise was in short supply (Bangs and Fritts 1996). Notwithstanding strong rhetoric and the threat by some opponents to “shoot, shovel, and shut up,” reintroduced wolves have thrived in the northern Rockies. Beginning in 2002—and in every year since—the NRM wolf metapopulation exceeded the population threshold specified for removal from ESA protections.

The question of how to manage wolves in the northern Rockies transcends the biological and ecological sciences (Fritts et al. 1997, Wilson MA 1997). Biologists directly involved in the reintroduction of wolves to the northern Rockies concluded that “wolf recovery issues have more to do with deeply held personal values...than with wolves themselves” (Fritts et al. 1997, p. 11). We concur with this assessment. Indeed, 15 years of intensive monitoring and rigorous biological studies have not reduced the conflict concerning wolf management, nor lessened the controversy surrounding wolf reintroduction. Instead, these management efforts underscore how intricately human behaviors are linked with the long-term success of wolves: Of 2094 wolf mortalities documented by the FWS over the past decade (i.e., from 2000 to 2009), 84% (1763) were caused by humans, and at least 80% of these (1402) were intentional (i.e., legal control actions or harvest). (We calculated these figures by aggregating data from the FWS's annual reports from 2000 to 2009, available online at www.fws.gov/mountain-prairie/species/mammals/wolf. Contact the authors for a copy of these data.) These data imply that the successful conservation of wolves in

the NRM region ultimately depends upon human behaviors and the values and attitudes that underlie these behaviors.

When threats to a species are driven primarily by social factors (e.g., attitudes and values), reliance on biological data alone is insufficient to understand and evaluate these threats. The application of theory and data from the social sciences can improve our understanding of the social components of these issues and contribute to better-informed policy decisions. In this article, we use the FWS's recent decision to remove NRM wolves from endangered species protection to illustrate how the social sciences can contribute to such decisions. Specifically, we examine the FWS's analysis of the threat posed by human attitudes toward wolves in light of the existing social science literature, and illustrate how the use of social science information can inform decisions regarding the listing status of endangered species.

Listing status determinations under the ESA

To determine the listing status of a species (i.e., threatened, endangered, or neither), the secretary of the interior or the

secretary of commerce (jurisdiction varies by species) must decide whether a species is threatened with or in danger of extinction throughout all or a significant portion of its range, as the result of any of five statutorily defined listing factors: (1) the present or threatened destruction, modification, or curtailment of its habitat or range; (2) overutilization for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) the inadequacy of existing regulatory mechanisms; or (5) other natural or anthropogenic factors affecting its continued existence.

Listing status determinations are to be made "solely on the basis of the best scientific and commercial data available" (16 USC §§ 1531–1544). In short, the ESA requires the secretary (and corresponding agency) to review the best available information and determine whether the balance of evidence indicates that the threat posed by these five factors is sufficient to warrant listing the species as threatened or endangered (figure 1). In practice, these "threats analyses" typically focus on the proximate causes of a species' mortality, and include an examination of relevant biological

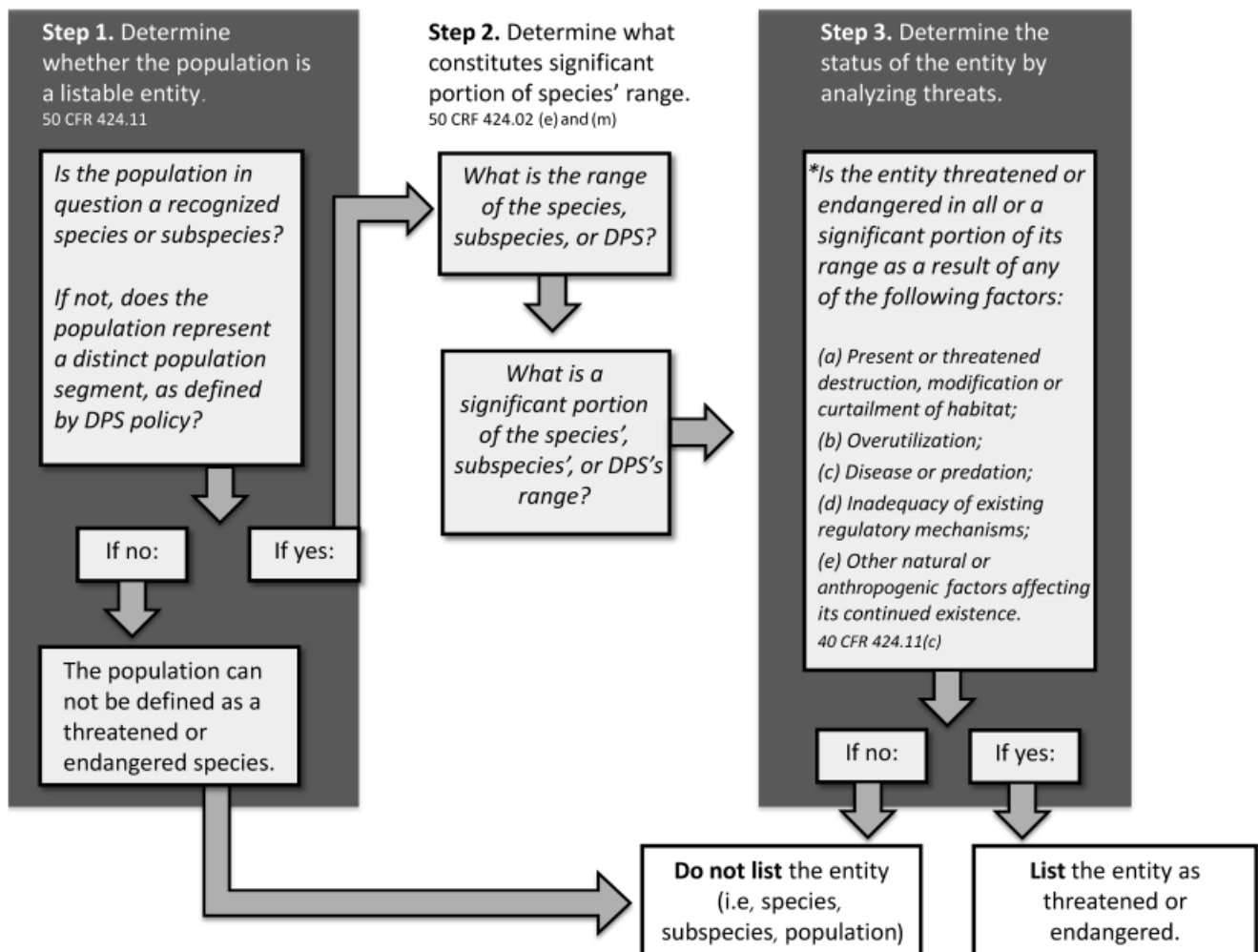


Figure 1. Determining the status of a species under the Endangered Species Act of 1973. The starred question is an analysis that could be improved by the inclusion of social science data. DPS, district population segment.

studies. We do not dispute the value of such information, but rather contend that the social sciences can also provide relevant information that should be considered in listing determinations. In what follows, we describe the FWS's assessment of the threat posed by attitudes toward wolves in the northern Rockies and examine their arguments in light of the best available social science data.

Delisting NRM wolves: The threat posed by human attitudes

In April 2009, the FWS published a final rule (USFWS 2009) designating the NRM population of gray wolves as a distinct population segment (DPS) and removing them from ESA protection. In the NRM final rule, the FWS argued that “human-caused mortality is the most significant issue to the long-term conservation status of the NRM DPS” and that “public tolerance” was critical to wolves' long-term recovery (USFWS 2009, p. 15,179). Because the FWS recognized that human attitudes toward wolves posed a potential threat to wolves in the NRM DPS, the agency analyzed attitudes toward wolves as part of its threats analysis in its final rule. Although the FWS noted that “hostility toward wolves led to excessive human-caused mortality that extirpated the species from the [NRM DPS] in the 1930s,” it argued that “attitudes toward wolves have improved greatly over the past 30 years,” and “post-delisting management by [states would]...enhance local public support for wolf recovery” (USFWS 2009, p. 15,175). The agency concluded that the management approaches employed by states “ensure[d] human attitudes toward wolves should not again threaten each state's contribution to a recovered wolf population” (USFWS 2009, p. 15,175).

Because the FWS explicitly acknowledged that human attitudes threaten wolves' continued existence, the agency is legally obligated to employ the best scientific and commercial data available in its analysis of this threat. But, although the NRM final rule contained an extensive literature review (65 pages, > 200 citations) on the ecology and behavior of wolves, it cited just one empirical study that examined human attitudes toward the species (i.e., Williams et al. 2002). This is not for a lack of literature on the topic. Bath and colleagues conducted several studies examining attitudes toward wolves in this region during the 1980s and 1990s (e.g., Bath 1987, 1989, 1992, Bath and Phillips 1990). More recently, a number of studies have examined residents' and park visitors' attitudes toward wolves (Duda et al. 2003, Taylor et al. 2005, Bruskotter et al. 2007, Duffield et al. 2008), and a 2002 review by the US Geological Survey identified 50 published papers, theses, and abstracts that specifically addressed the topic (Browne-Nunez and Taylor 2002). Because it cited just one of these studies, the FWS appears to be unaware of the larger body of social science research on attitudes toward wolves.

In reaching the conclusion that the NRM wolf population is not a threatened or endangered species, the FWS made four key arguments about the public's attitudes toward

wolves that can be summarized as follows: (1) human attitudes are a potential threat to wolves because human-caused wolf mortality, driven by human attitudes, extirpated wolves from this region in the first place; (2) the threat posed by human attitudes has lessened substantially because public attitudes have improved in recent decades; (3) state management of wolves will foster local support of wolves and wolf recovery; and (4) existing state regulatory mechanisms will “balance negative attitudes” and ensure recovery (see USFWS 2009, p. 15,175, p. 15,179). We critically evaluate these four arguments and the threats posed by attitudes toward wolves in light of the existing social science research and recent actions of state government officials within the NRM DPS.

1. Are attitudes a potential threat to NRM wolves?

In order to determine whether human attitudes threaten an endangered species, one must first establish that people—through relevant behaviors—have the ability to negatively affect a species. In the case of NRM gray wolves, there is little question that humans can and do affect wolf populations. Mortality data aggregated from the FWS's NRM wolf recovery annual reports indicate that humans cause the vast majority of all wolf deaths in the NRM DPS. Moreover, the proportion of deaths that were caused by humans has increased substantially over the previous decade, from roughly two-thirds in 2000 to nine-tenths in 2009 (figure 2).

A second condition necessary to establish that human attitudes threaten wolves is a causal link between attitudes and behaviors. Theory and data from the social sciences substantiate the connection between attitudes and behavior, which is especially well established in the field of social psychology (see Eagly and Chaiken 1993 for a review). The literature on human perceptions of wolves also supports this relationship. For example, Wilson and Bruskotter (2009) found that attitude toward wolf restoration was strongly correlated ($r = 0.85$) with one's intention to vote in favor of wolf restoration. Similarly, Williams and colleagues (2002) found a strong correlation ($r = 0.82$) between positive attitudes toward wolves and support for wolf reintroduction. However, although numerous studies have correlated attitudes toward wolves with support for particular policies (e.g., lethal control, wolf restoration) or intentions to engage in behaviors (e.g., vote for wolf restoration), the relationship between attitudes toward wolves and actions actually undertaken to affect wolves (e.g., illegal killing) is likely to depend on one's access to wolves and one's motivation to engage in such behavior.

The FWS further argued that human hostility toward wolves in the 1930s led to their extirpation from the NRM DPS. Although widely regarded as factual, this argument is particularly hard to evaluate. The earliest efforts to assess attitudes toward wolves did not begin until the 1970s (e.g., Johnson 1974); therefore, we are limited to inferences from historical accounts of government policies promoting wolf eradication. However, to the extent that such policies can be

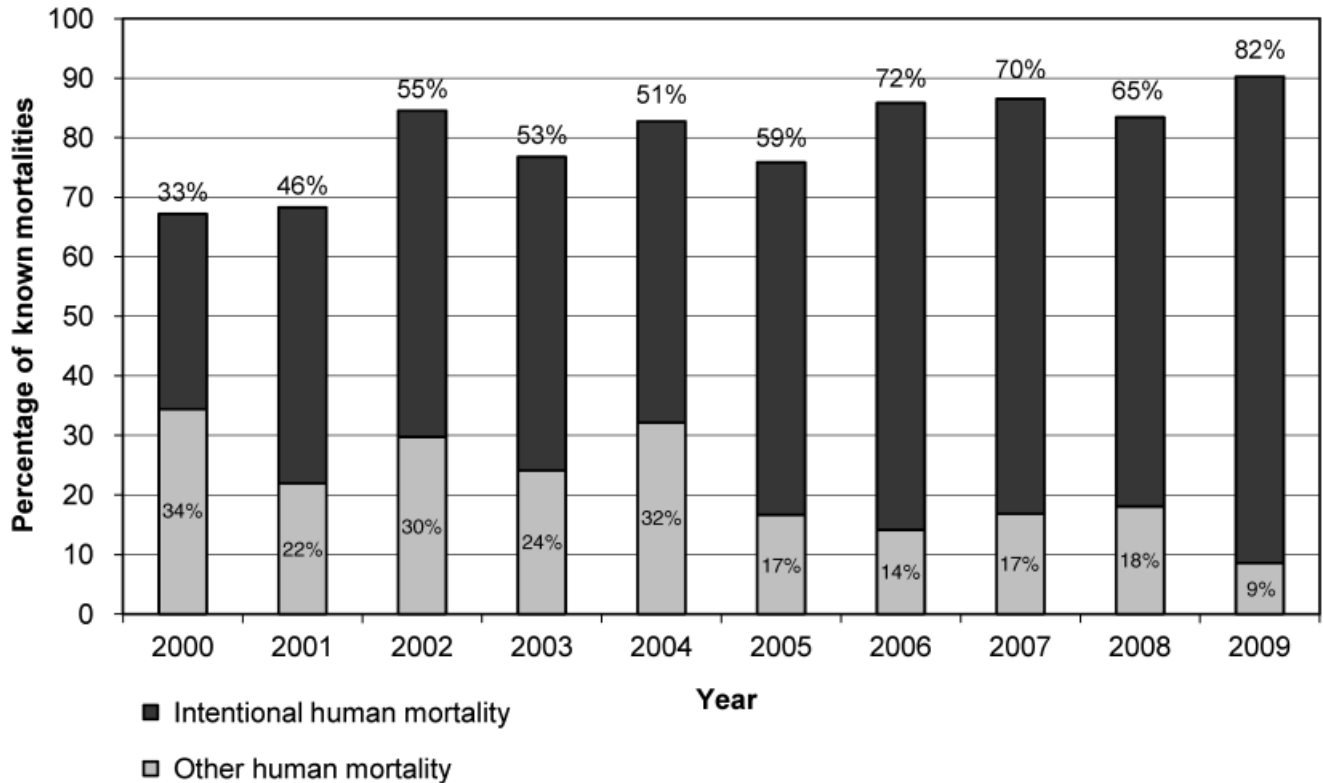


Figure 2. Percentage of wolf mortalities in the northern Rocky Mountains attributable to human causes (2000–2009).

viewed as proxies for human attitudes, ample evidence exists to support this view (Kellert et al. 1996, Feldman 2007). Policies of predator control and eradication in the late 1800s and early 1900s were the norm and were directed not just at wolves but also at coyotes (*Canis latrans*), mountain lions (*Puma concolor*), and grizzly bears (*Ursus arctos*) (Kellert et al. 1996, Feldman 2007). Thus, the complete eradication of wolves may not have been the result of efforts directed at wolves, specifically, but rather the result of general hostility exhibited toward predators at that time.

2. Have attitudes toward wolves improved?

The FWS contended that human attitudes no longer pose a threat to wolves in the northern Rockies because “public attitudes toward wolves have improved greatly over the past 30 years” (USFWS 2009, p. 15,179). However, this argument greatly oversimplifies the empirical research literature. Although Kellert and colleagues (1996) postulated that US residents’ attitudes underwent a “significant attitudinal transformation” during the latter part of the 20th century, they cited no empirical work to support this claim. Rather, the attitudinal transformation they described seems to have been inferred largely from changes in policies regarding predators in North America that coincided with the environmental movement during the 1960s. Recent research indicates that people’s value orientations concerning wildlife are driven primarily by the forces of modernization (e.g., increases in income, education, and urbanization), which

shifted dramatically following World War II (see Manfredo et al. 2009) and probably gave rise to the policy changes that took place during the 1960s.

Our review found only a handful of studies that empirically evaluated attitudes toward wolves over time, and rather than providing support for the FWS’s conclusions, the findings are decidedly mixed. While Kellert (2000) found evidence of an increased “affection for...wolves” in Minnesota, he also found increased support for the control of wolf damage to livestock. Ericsson and Heberlein (2003) found similar results when comparing two Swedish surveys conducted over a 25-year period; although the general public was more positive toward wolves, hunters’ attitudes were more negative. Duda and colleagues (1998) found Adirondack area residents’ support for wolf reintroduction decreased from 76% in 1996 to 46% in 1997, and a subsequent study found just 42% of those surveyed supported wolf reintroduction (Enck and Brown 2002). Enck and Brown (2002) hypothesized that this decline in support resulted from extensive negative media coverage concerning a proposed reintroduction in the area. In the one empirical study of attitudes toward wolves cited in the NRM final rule (a meta-analysis), Williams and colleagues (2002) concluded: “Across the 37 attitude surveys we studied, the reported statistics were stable over the last 30 years. This contradicts a recent perception among some ecologists that wolf support has recently grown” (p. 581).

Consistent with this conclusion, the only study to longitudinally examine human attitudes toward wolves among

residents of any portion of the NRM DPS found that Utah residents' attitudes did not change over an approximately 10-year time frame (Bruskotter et al. 2007). Despite this evidence, the FWS concluded that attitudes toward wolves have "greatly improved" in the past 30 years, and therefore, the threat of wolf extirpation in the NRM DPS has been diminished. Such a conclusion is not supported by the data, but rather appears to be based upon the very misperception of increasing "wolf support" to which Williams and colleagues (2002) refer.

A more recent study—not available at the time of delisting—suggests attitudes toward wolves in the northern Rockies may be becoming more negative. Specifically, a content analysis of news media coverage indicates that public discourse about wolves in the northern Rockies became increasingly negative from 1999 to 2008 (Houston 2009).

3. Will state management foster support for NRM wolves?

The FWS asserted "post-delisting management by [states] will further enhance public support for wolf recovery" and that state management of wolves "ensures human attitudes toward wolves should not again threaten each state's contribution to a recovered wolf population" (USFWS 2009, p. 15,175). A recent survey of Idaho residents, hunters, and livestock producers conducted by the Idaho Department of Fish and Game (IDFG) shed some light on this claim. Results indicate the majority of all groups surveyed do indeed support removing wolves from the endangered species list, and support hunting them as a means of controlling wolf populations (IDFG 2008). The survey also contained several items that provide a more complete understanding of these responses, including potential motivations for supporting state management. Specifically, results indicate that approximately 75% of deer and elk hunters and 86% of livestock producers agreed that the best management strategy for wolves was "to reduce wolf populations to the minimum pack numbers necessary to keep them off the Endangered Species List" (IDFG 2008). Moreover, 64% of deer and elk hunters and 69% of livestock producers agreed that "the Federal government had no right to reintroduce [wolves] into Idaho" (IDFG 2008), and more than three-fourths of deer and elk hunters and livestock producers agreed that "there are not enough elk to go around, and hunters shouldn't have to compete with wolves for elk to harvest" (IDFG 2008). Although the results of this survey indeed support the assertion that Idaho residents want Idaho—and not the federal government—to manage wolves, nothing in these data suggests state management will change attitudes toward wolves or increase support for the species. Rather, these data show that two of the most powerful stakeholders in the state (i.e., big-game hunters and livestock producers) are motivated to kill as many wolves as possible without returning wolves to federal protection.

Some readers may question our focus on the attitudes of hunters and livestock producers; for example, one might

point out that a majority of nonhunters (60%)—who make up a majority of Idaho residents—agreed with this statement: "It is important to me that wolves exist in Idaho" (IDFG 2008). Our focus on the attitudes of hunters and livestock producers recognizes that these groups exert strong political influence over wildlife management in the western United States (Nie 2004). Furthermore, hunters, ranchers, and other rural residents have direct access to wolves, and are thus more likely to have an opportunity to influence wolf populations. Notably, in their meta-analysis, Williams and colleagues (2002) found that groups who exhibited the most negative attitudes toward wolves were (a) ranchers and farmers, (b) rural residents, and (c) hunters and trappers, thus underscoring the importance of these groups.

The second component of the FWS's claim—that state agencies' efforts will ensure favorable attitudes—is also questionable. This argument implicitly assumes that agencies will attempt to promote wolves as a valued part of the ecosystem. However, as recently as February 2009 the IDFG released a report in which the agency estimated the negative economic impacts of wolves on hunting revenues. The report assumed that wolf-caused mortality of elk was additive (not compensatory), and that the killing of elk by wolves would directly—and negatively—affect other big-game hunting opportunities—and in turn, the sale of elk hunting licenses. The report made no mention of the documented positive economic impacts of wolves as a result of increased tourism, which dramatically outweigh the negative impacts estimated by the IDFG (Duffield et al. 2008). Even if agencies were interested in promoting wolf recovery, research indicates that efforts to change attitudes toward wolves using direct informational interventions yield little or no effect (Meadow et al. 2005, Wilson and Bruskotter 2009). Indeed, the relationship between human attitudes toward wolves and more deeply ingrained cultural values (Wilson MA 1997) suggests localized opposition to wolves is unlikely to change, which led Williams and colleagues (2002) to conclude that managers "should recognize that attitudes toward wolves, tied to economic interest and broader ideological conflict, will change very little, and...not be susceptible to education campaigns" (p. 582).

4. Are state regulatory mechanisms likely to balance negative attitudes?

Although the FWS acknowledged that attitudes could affect wolf recovery, it argued that the regulatory mechanisms put in place by states "will balance negative attitudes towards wolves in the places necessary for recovery" and ensure that NRM wolf populations are not again threatened with extinction (USFWS 2009, p. 15,175). We see reasons to be positive about the wolf management plans developed by state agencies; however, the FWS's assumption that the actions of state agencies will ensure continued NRM DPS wolf recovery is overly optimistic. Removing wolves from the endangered species list means turning over management to the relevant states, which have little incentive to consider the desires of

those from outside their borders. Moreover, state wildlife management agencies will be forced to pay close attention to the desires of hunters, whom they have long viewed as paying clients, and ranchers, who have powerful political lobbies in the West (see Nie 2004 for a discussion). In fact, state wildlife boards and commissions, which are ultimately responsible for making policy decisions for agencies, are often heavily weighted in favor of hunters and agricultural interests. The disproportionate influence of these groups on wildlife policy in the West is captured in the Utah Division of Wildlife Resources' position on wolves: "Many statements have been made to the effect that the Regional Advisory Councils and the Utah Wildlife Board are dominated by agricultural and sportsmen interests, thus making them incapable of developing sound wolf management policy. I would concur that the views and concerns of these two interests groups play a dominant role in the development of wildlife policy in Utah, and rightfully so.... By statute, the legislature has appropriately given landowners and sportsmen a prominent seat at the policy making table in Utah" (UDWR 2002).

The ability of hunters and livestock producers to affect wildlife policy in the West is not limited to their influence with wildlife management agencies. In February 2010, after the FWS published the NRM final rule, the Utah Senate passed SB 36, which requires the Utah Division of Wildlife Resources to abandon its wolf management plan in favor of a plan to "prevent the establishment of a viable pack in all areas of the state where the wolf is not listed as threatened or endangered...until the wolf is completely delisted under the [ESA]." The bill justified this action by arguing that Utah "cannot adequately or effectively manage wolves...without significantly harming other vital state interests, including livestock and big game populations." Notably, according to the Utah Division of Wildlife Resources, there was no known population of wolves in Utah when SB 36 passed.

Explicit antiwolf legislation is not limited to Utah. In 2001, the Idaho State Legislature passed House Joint Memorial No. 5, demanding that "wolves be removed [from Idaho] by whatever means necessary." A year later Idaho reaffirmed this position in Senate Concurrent Resolution No. 134, again calling for the removal of wolves from Idaho, and in 2009 the Idaho House of Representatives passed House Bill No. 138, which imposed liability on FWS officials if someone is injured or killed by wolves. In 2007, Idaho's governor publicly declared that he would support a hunt to kill all but 100 of the more than 800 wolves estimated to be living in the state at that time (Alderman 2007). These actions underscore the tenuous nature of state wolf management plans and the provisions concerning wolves set forth therein.

To be clear, although we do not question the capacity of state wildlife management agencies to develop policies for the sustainable management of wolves, the actions of state government officials demonstrate the extent to which wildlife management agencies will be limited in their ability to implement such policies over the long term. Ultimately, the authority to manage wildlife emanates from state legislatures

that have evidenced clear hostility toward wolves, and demonstrated a willingness to intervene on the behalf of powerful interest groups that oppose the presence of wolves. Given the policy preferences of hunters and livestock producers recently documented in IDFG's survey (2008), the historical antipathy of these groups toward wolves (Williams et al. 2002), and their dominant role in western wildlife policy (Nie 2004), we are skeptical that existing regulatory mechanisms will remain in place in the foreseeable future.

Analysis of threats of attitudes toward wolves in the NRM

In its final rule, the FWS argued that human attitudes potentially threaten wolves in the NRM DPS. Even a cursory review of the relevant literature supports this conclusion; however, the FWS's analysis of the extent to which human attitudes threaten wolves was guided by at least three faulty assumptions. Specifically, contrary to the FWS's arguments, the existing social science literature suggests that (a) attitudes toward wolves are generally stable in the United States, but could be deteriorating in the NRM region, indicating the threat posed by attitudes in this region has not decreased since reintroduction; (b) a shift to state management is unlikely to change attitudes and, more importantly, state agencies are likely to face strong pressure from influential interest groups (i.e., hunters, livestock producers) to significantly reduce wolf populations; and (c) the policy preferences of these constituencies could force state agencies to modify existing regulatory mechanisms cited by the FWS as justification for delisting wolves.

Our finding of fault with the FWS's analysis of threats should not be interpreted as a condemnation of the agency's conclusions. As Freyfogle and Goble (2009) noted, determining the status of endangered species requires agencies to answer two fundamental questions: (1) What is the risk of extinction to the species? and (2) Is this risk acceptable? We recognize that such determinations will always contain a high degree of subjectivity that reflects not only agencies' confidence in evaluating risks, but more importantly, the normative nature of judgments regarding the acceptability of these risks (Sabatier 1978). Our purpose in highlighting faults in the FWS's analysis is to demonstrate that information from the social sciences can contribute meaningfully to a threats analysis, and in this case the best available data—which do not appear in the FWS analysis—largely conflict with the FWS's assumptions about human attitudes. Thus, to the extent that these faulty assumptions guided the FWS's assessment of the threat posed by human attitudes toward wolves, we conclude that this threat has been underestimated.

A role for the social sciences

Numerous calls have been made for resource management agencies to better integrate the social sciences into their research agendas and policy decisions (e.g., Primm and Clark 1996, Endter-Wada et al. 1998, Mascia et al. 2003).

Our analysis demonstrates one way this laudable goal can be accomplished. Specifically, when agency decisions turn on assumptions about society, then agencies should employ appropriate social-science methodologies (or use existing data) to evaluate those assumptions. With respect to endangered species status determinations, when threats to a species's continued survival are primarily social in nature, the FWS should exercise the same effort and care that goes into monitoring and analyzing biological and ecological threats.

Drawing on social-science theory and methods to increase scientific understanding of the social components of these issues, rather than making potentially inaccurate assumptions, can contribute to improved policy and management decisions. The social sciences provide a suite of methods for examining not only individual attitudes and behaviors but also for identifying broader social, cultural, political, and economic factors that affect such attitudes and related behaviors (Endter-Wada et al. 1998).

We recognize that there are legitimate concerns about the public's role in developing management plans for endangered wildlife. As Mech (1996) warned: "If major carnivore management decisions are determined by public mood rather than by knowledge of professionals, we could end up with California full of carnivores and North Dakota with none" (p. 400). Our position—that the conservation and management of natural resources can be improved by including a greater emphasis on social-science data—should not be interpreted as ceding control of decisions to public whims. Information on the values and attitudes of affected human populations should not supersede key biological or ecological data, but should be gathered, interpreted, and used in tandem with biological and ecological information to provide a more complete picture of the issues and the context in which management decisions are made. In our view, surveys of affected stakeholders should never be used to set public policy, but should instead inform policy decisions—the same way biological and ecological data should be used. However, although listing decisions would never be made without verifiable, empirical data on such things as population size, birth rates, and reproductive success, wildlife managers seem comfortable making assumptions about human attitudes that are at least as critical to a successful and sustained recovery.

Our review highlights the bias against the social sciences that is pervasive in wildlife management and, more generally, in conservation science. This traditional view of conservation science as limited to biology prevents meaningful dialogue among biologists, managers, and social scientists, decreasing the likelihood that relevant social-science information will be considered in policy decisions. Indeed, the primary limitation of our review is due, in part, to the FWS's myopic focus on biological data. Although the FWS has directly administered or supported substantial research on the biological aspects of wolf recovery, there was no similar systematic effort to collect longitudinal data on the attitudes

and policy preferences of NRM residents. Unfortunately, the few studies conducted within the NRM are difficult to compare because of differences in survey methodologies, instrumentation, and populations studied. These limitations underscore the need for well-designed, longitudinal studies about attitudes and human interactions with wolves within the recovery area. More importantly, they lead us to ask why—if the FWS believed human attitudes caused wolves' extirpation in the northern Rockies—the agency hasn't undertaken or supported research efforts to scientifically evaluate this threat?

Bergstrom and colleagues (2009) recently concluded that the FWS and secretary of the interior "ignored the best available science" with respect to wolves. Whether the agency ignored the existing social-science literature or was simply unaware of this research is largely irrelevant. What is clear is that this information was not used in the NRM final rule in accordance with the ESA's mandate that listing determinations be based "solely on the...best scientific and commercial data available." It is time for the FWS to expand its view of what constitutes "science" and fully incorporate the social sciences into listing decisions. The FWS can strengthen future analyses of human-caused threats to endangered species by increasing support for social-science research and, where appropriate, including social scientists as peer reviewers as part of the Interagency Policy for Peer Review in Endangered Species Act Activities (59 *Federal Register* 34,270, 1 July 1994).

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References cited

- Adams WM. 2007. Thinking like a human: Social science and the two cultures problem. *Oryx* 41: 275–276.
- Alderman JH. 2007. Idaho gov. wants to kill all but 100 wolves in state. *Summit Daily News*. 12 January. (9 September 2010; www.summitdaily.com/article/20070112/NEWS/70112004)
- Bangs EE, Fritts SH. 1996. Reintroducing the gray wolf to central Idaho and Yellowstone National Park. *Wildlife Society Bulletin* 24: 402–413.
- Bath AJ. 1987. Statewide Survey of the Wyoming General Public Attitudes towards Wolf Reintroduction in Yellowstone National Park. US National Park Service, Mammoth, Wyoming.
- . 1989. The public and wolf reintroduction in Yellowstone National Park. *Society and Natural Resources* 2: 297–306.
- . 1992. Identification and documentation of public attitudes toward wolf reintroduction in Yellowstone National Park. Pages 2.3–2.30 in Varley JD, Brewster WG, eds. *Wolves for Yellowstone? A Report to the United States Congress*. US National Park Service, Yellowstone National Park.
- Bath AJ, Phillips C. 1990. Statewide Surveys of Montana and Idaho Resident Attitudes toward Wolf Reintroduction in Yellowstone National Park. Report submitted to Friends for Animals, National Wildlife Federation. US Fish and Wildlife Service and US National Park Service.
- Bergstrom BJ, Vignieri S, Sheffield SR, Sechrest W, Carlson AA. 2009. The northern Rocky Mountain gray wolf is not yet recovered. *BioScience* 59: 991–999.
- Browne-Nunez C, Taylor JG. 2002. *Americans' Attitudes toward Wolves and Wolf Reintroduction: An Annotated Bibliography*. US Geological Survey. 2002-0002.

- Bruskotter JT, Schmidt RH, Teel TL. 2007. Are attitudes toward wolves changing? A case study in Utah. *Biological Conservation* 139: 211–218.
- Duda MD, Bissell SJ, Young KC. 1998. Wildlife and the American Mind. Public Opinion on and Attitudes toward Fish and Wildlife Management. Responsive Management National Office.
- Duda MD, Michele PED, Zurawsk C, Jones M, Yoder J, Testerman W, Lanier A, Bissell SJ, Wang P, Herrick JB. 2003. Wyoming Residents' Attitudes Toward and Opinions on Wolf Management in Wyoming. Responsive Management National Office.
- Duffield JW, Neher CJ, Patterson DA. 2008. Wolf recovery in Yellowstone: Park visitor attitudes, expenditures, and economic impacts. *George Wright Forum* 25: 13–19.
- Eagly AH, Chaiken S. 1993. *The Psychology of Attitudes*. Harcourt.
- Enck JW, Brown TL. 2002. New Yorkers' attitudes toward restoring wolves to the Adirondack Park. *Wildlife Society Bulletin* 30: 16–28.
- Endter-Wada J, Blahna D, Krannich R, Brunson M. 1998. Framework for understanding social science contributions to ecosystem management. *Ecological Applications* 8: 891–904.
- Ericsson G, Heberlein TA. 2003. Attitudes of hunters, locals, and the general public in Sweden now that the wolves are back. *Biological Conservation* 111: 149–159.
- Feldman JW. 2007. Public opinion, the Leopold Report, and the reform of federal predator control policy. *Human-Wildlife Conflicts* 1: 12–24.
- Freyfogle ET, Goble DD. 2009. *Wildlife Law: A Primer*. Island Press.
- Fritts SH, Bangs EE, Fontaine JA, Johnson MR, Phillips MK, Koch ED, Gunson JR. 1997. Planning and implementing a reintroduction of wolves to Yellowstone National Park and central Idaho. *Restoration Ecology* 5: 7–27.
- Houston MJ. 2009. A quantitative content analysis of attitude expressions toward wolves in the United States and Canadian print news media, 1999–2008. Master's thesis. Ohio State University, Columbus.
- [IDFG] Idaho Department of Fish and Game. 2008. Idaho Wolf Population Management Plan: 2008–2012. IDFG.
- Jacobson SK, McDuff M. 1998. Training idiot savants: The lack of human dimensions in conservation biology. *Conservation Biology* 12: 263–267.
- Johnson RT. 1974. On the spoor of the big bad wolf. *Journal of Environmental Education* 6: 37–39.
- Kellert SR. 2000. *The Public and the Wolf in Minnesota, 1999: A Report for the International Wolf Center*. International Wolf Center.
- Kellert SR, Black M, Rush CR, Bath AJ. 1996. Human culture and large carnivore conservation in North America. *Conservation Biology* 10: 977–990.
- Manfredo MJ, Teel TL, Henry KL. 2009. Linking society and environment: A multilevel model of shifting wildlife value orientations in the western United States. *Social Science Quarterly* 90: 407–427.
- Mascia MB, Brosius JP, Dobson TA, Forbes BC, Horowitz L, McKean MA, Turner NJ. 2003. Conservation and the social sciences. *Conservation Biology* 17: 649–650.
- Meadow R, Reading RP, Phillips M, Mehringer M, Miller BJ. 2005. The influence of persuasive arguments on public attitudes toward a proposed wolf restoration in the southern Rockies. *Wildlife Society Bulletin* 33: 154–163.
- Mech LD. 1996. A new era for carnivore conservation. *Wildlife Society Bulletin* 24: 397–401.
- Nie MA. 2003. *Beyond Wolves: The Politics of Wolf Recovery and Management*. University of Minnesota Press.
- . 2004. State wildlife governance and carnivore conservation. Pages 197–218 in Fascione N, Delach A, Smith ME, eds. *People and Predators: From Conflict to Coexistence*. Island Press.
- Primm SA, Clark TW. 1996. Making sense of the policy process for carnivore conservation. *Conservation Biology* 10: 1036–1045.
- Sabatier P. 1978. The acquisition and utilization of technical information by administrative agencies. *Administrative Science Quarterly* 23: 396–417.
- Taylor JG, Johnson SS, Shelby LB. 2005. Public Acceptance of Management Actions and Judgments of Responsibility for the Wolves of the Southern Greater Yellowstone Area: Report to Grand Teton National Park. US Department of Interior, US Geological Survey.
- [UDWR] Utah Division of Wildlife Resources. 2002. Wolves in Utah: DWR position on Wolves in Utah. UDWR. (9 September 2010; <http://wildlife.utah.gov/wolf/position.php>)
- [USFWS] US Fish and Wildlife Service. 2009. Final Rule to Identify the Northern Rocky Mountain Population of Gray Wolf as a Distinct Population Segment and to Revise the List of Endangered and Threatened Wildlife. *Federal Register* 74: 15,123. (16 September 2010; www.fws.gov/mountain%2Dprairie/species/mammals/wolf/)
- Williams CK, Ericsson G, Heberlein TA. 2002. A quantitative summary of attitudes toward wolves and their reintroduction (1972–2000). *Wildlife Society Bulletin* 30: 575–584.
- Wilson MA. 1997. The wolf in Yellowstone: Science, symbol, or politics? Deconstructing the conflict between environmentalism and wise use. *Society and Natural Resources* 10: 453–468.
- Wilson RS, Bruskotter JT. 2009. Assessing the impact of decision frame and existing attitudes on support for wolf restoration in the United States. *Human Dimensions of Wildlife* 14: 353–365.

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