

Scientist perspectives toward the status and management of gray wolves in the western United States

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Abstract

To inform conservation policy, we solicited scientist perspectives on a controversial conservation issue—the US Fish and Wildlife Service status review to relist gray wolves in the western United States on the Endangered Species Act. Our survey of authors of recent scientific publications on US wolves ($n = 84$; 26% response rate) indicated that about two-thirds of respondents supported relisting. About 80% disapproved of Idaho and Montana wolf management plans and believed that they pose a threat to wolf populations in the western United States. Nearly half of respondents were unsure if population estimates of wolves in Idaho and Montana were accurate and reliable and about a fifth believed they were not. Both proponents and opponents of relisting primarily offered policy-based arguments about state versus federal management, followed by biological arguments about threats to wolves, and social and ethical arguments about wolves and their management.

KEY WORDS

Canis lupus, Endangered Species Act, gray wolf, harvest, management, policy, United States

1 | INTRODUCTION

A growing body of literature has highlighted the importance of soliciting and integrating scientist perspectives into conservation policy, particularly for complex, uncertain, or contentious issues (Lewandowsky et al., 2013; Martin et al., 2012). Eliciting expert opinion can guide management decisions for urgent conservation problems because of the depth of scientific knowledge and personal experience that influences such perspectives (Martin et al., 2012). The extent of scientific agreement also can influence public opinion about, and support for, conservation initiatives (Cook et al., 2017; Lewandowsky et al., 2013). However, public misperceptions on the degree of scientific consensus can decrease support for

conservation efforts. For example, misconceptions about the high degree of scientific consensus regarding anthropogenic climate change (approximately 97%) result in public uncertainty, lack of concern, and inaction (Cook et al., 2017). Despite the importance of including scientific perspectives into decision-making, scientists who make policy claims based on their expert opinion can risk criticism of advocacy and perceived damage to their scientific credibility, thus dissuading their input on controversial conservation issues (e.g., Lackey, 2007; Scott & Rachlow, 2011; but see Kotcher et al., 2017; Wittemyer et al., 2018).

Gray wolf (*Canis lupus*) recovery is a controversial and politicized issue, fraught with conflict over management strategies, recovery goals, and deeper identities and

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values (Ditmer et al., 2022; Nie, 2002; Niemic et al., 2022; van Eeden et al., 2021; Wilson, 1997; Zimmerman et al., 2020). Once inhabiting much of North America, gray wolves were eradicated from most of their historic range in the lower 48 US states by the early 20th century as a result of predator control programs and reduced prey and habitat availability (Mech, 2017). The gray wolf was listed as an Endangered Species under the US Endangered Species Preservation Act of 1966 and legally protected under the Endangered Species Act (ESA) of 1973. Following reintroduction in Yellowstone National Park and central Idaho in the mid-1990's, wolf populations expanded into adjacent areas in the US northern Rocky Mountains and Pacific Northwest. Consequently, in a series of policy decisions since 2011, gray wolves were delisted from the ESA in Montana, Idaho, Wyoming, eastern Oregon and Washington, and parts of Utah; according to state population estimates, over 2500 wolves reside in the western United States as of 2019–2020 (USFWS, 2021).

In September, 2021, the US Fish and Wildlife Service (USFWS) released a 90-day finding petition review, responding to two petitions they received to relist gray wolves in the western United States under the ESA (USFWS, 2021). Both petitions claimed that recently enacted wolf management legislation in Idaho and Montana—expanding legal methods of take, extending trapping seasons, and increasing harvest limits—would result in “drastically reduced wolf populations” in those two states. The USFWS (2021) concluded that the “petitioners have presented credible information supporting their claim and that increased human-caused mortality in Idaho and Montana may pose a threat to wolves in those two States, and to the status of the petitioned entities as a whole, such that the species may be threatened or endangered.” As a result, the USFWS decided to conduct a comprehensive status review to determine whether to relist gray wolves in the western United States under the ESA.

Our objective was to solicit expert scientific opinions on how western states are managing gray wolves and on the ongoing status review by the USFWS on whether to relist wolves in the western United States. To do so, in February 2022, we conducted a survey of authors of scientific publications on wolf biology, management, or conservation in the United States over the past 5 years, asking their opinions on the USFWS 90-day finding petition review. Our intent was to evaluate the extent of agreement among scientific experts on wolves on this contentious policy decision and to provide an opportunity for scientists to anonymously share their expert opinion so that it could be amplified in policy discussions.

2 | METHODS

2.1 | Study population

To identify authors of scientific publications on wolves in the United States over the past 5 years (2017–2022), we conducted a systematic search of the scientific literature (on January 19, 2022) using the Web of Science database. To promote inclusion of authors with an understanding of wolves in the United States specifically, the search was restricted to authors with a US institutional affiliation and to studies conducted on wolves in the United States. We filtered for articles, review articles, books, and book chapters published between 2017 and 2022 that were in English. We used the search strings of “wolf,” “wolves,” and “*Canis lupus*.” This led to a total of 275 publications. We then conducted a title screening to remove papers not about gray wolves (e.g., “wolf spider” or “maned wolves”) or that referenced international studies; this resulted in the inclusion of 185 papers with 614 authors. After removing duplicate names and authors with international institutional addresses, we found email addresses for a total of 341 US authors and sent them an email invitation on February 1, 2022, to complete our anonymous online survey. Thirty three emails bounced back; we found revised emails for 14 of those, resulting in a total of 322 email invitations delivered.

We distributed the survey as an anonymous link directly to participants to ensure their confidentiality when sharing their perspectives. The recruitment email explained the study objective and that they had been specifically selected to participate as an expert who had published on wolf conservation, biology, or management in the last 5 years. After participants accepted the survey, we obtained informed consent by providing a description of the study and asking participants to agree (or not) before proceeding to take the survey. Following this, we added a screener question to ensure only scientists who had published on wolves in the United States in the last 5 years would move forward with the survey.

2.2 | Survey instrument

Respondents were provided with language taken directly from the USFWS 90-day finding petition review (USFWS, 2021) and asked their opinion on it (Data S1). Because the decision to list the gray wolf in the western United States is a binary yes/no policy decision, we asked respondents a binary survey question on whether they support or oppose relisting, followed by an open-ended question asking respondents to explain their reasons for support or opposition. This open-ended item allowed us

to explore the type of supporting arguments experts provided when sharing their opinions. Additionally, to reflect the USFWS finding language, we asked respondents if they believe that human-caused mortality may pose a threat to gray wolf populations in Idaho and Montana; the acceptability of the state management plans and hunting methods for wolves in Idaho and Montana, as described in the USFWS finding; and the degree to which population estimates of wolves in Idaho and Montana are accurate and reliable, given such estimates are critical determinants of potential relisting (Data S1).

The only background we provided in the survey was based on a summary of and direct quotes from the USFWS 90-day finding petition review, including descriptions of the recently enacted wolf management legislation in both Idaho and Montana (USFWS, 2021). We did not provide additional information on wolf biology, management, or conservation in Idaho, Montana, or elsewhere given that the survey was designed to elicit expert opinion regarding the USFWS 90-day finding petition review specifically.

2.3 | Qualitative analysis

To analyze short answer responses regarding reasons for support or opposition to relisting, we conducted thematic content analysis (Braun & Clarke, 2006; Saldaña, 2016). Our coding of responses included a five-step iterative process using the triangulation method across multiple investigators to inductively develop categories and themes applied during coding (Creswell & Miller, 2000). In the final step, two team members used the codebook (Data S1) to jointly code all open-ended responses.

3 | RESULTS

3.1 | Respondent characteristics

After removing duplicate surveys ($n = 21$), those who did not provide informed consent ($n = 2$), those who indicated through the screening question that they had not published on US wolves in the past 5 years ($n = 9$), and incomplete responses ($n = 4$), we analyzed a total of 84 responses, for a response rate of 26%. Seventy six percent of respondents ($n = 64$) had a PhD and 18% ($n = 15$) had a Master's degree as their highest level of education. Sixty percent of respondents ($n = 50$) were from academic institutions, 17% ($n = 14$) were from federal agencies, 12% ($n = 10$) were from state wildlife agencies, and 2% ($n = 2$) were from non-governmental organizations.

3.2 | Policy perspectives

Sixty eight percent of respondents ($n = 57$) indicated that they supported relisting gray wolves in the western United States on the ESA (Figure 1), including 82% of academics ($n = 41$ out of 50 academic respondents) and 46% of federal and state agency employees ($n = 11$ out of 24 agency respondents). Eighty three percent ($n = 68$) indicated they believed that increases in human-caused mortality in Idaho and Montana may pose a threat to gray wolf populations in the western United States. When asked whether they believed current state management plans and hunting methods in Idaho and Montana were acceptable, 80% of respondents ($n = 65$) indicated that they were extremely, moderately, or somewhat unacceptable (Figure 2). When asked about the accuracy and reliability of Idaho and Montana's population estimates for

Do you support relisting gray wolves in the western United States on the Endangered Species Act?

Do you believe that increases in human-caused mortality in Idaho and Montana may pose a threat to gray wolf populations in the western United States?

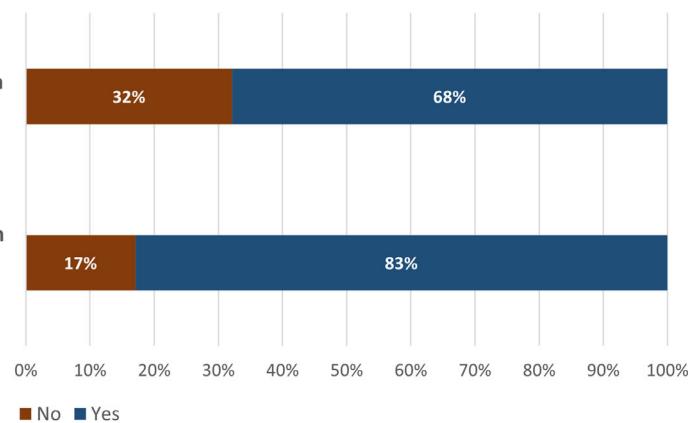


FIGURE 1 Responses of US scientists who have published about US wolf biology, management, or conservation in the past 5 years to questions related to the ongoing status review by the US Fish and Wildlife Service on whether to relist gray wolves in the western United States to the Endangered Species Act

How acceptable do you think current state management plans and hunting methods in Montana and Idaho are for managing wolves in these states?

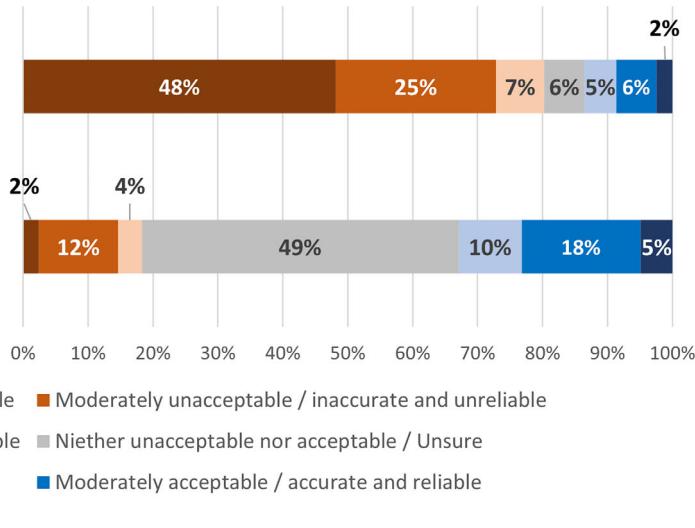


FIGURE 2 Responses of US scientists who have published about US wolf biology, management, or conservation in the past 5 years to questions related to the acceptability of management plans for wolves in Montana and Idaho and the reliability of population estimates in these states

wolves in their states, 49% ($n = 40$) indicated that they were “not sure,” 33% ($n = 27$) indicated they were extremely to somewhat accurate and reliable, and 18% ($n = 15$) indicated they were extremely to somewhat inaccurate and unreliable.

3.3 | Reasons for relisting support or opposition

Ninety three percent of survey participants ($n = 78$) provided a response to our open-ended survey item asking respondents to describe why they support or oppose relisting of gray wolves in the western United States to the ESA (Data S1). Across both proponents and opponents, we identified three overarching categories of arguments: (1) Policy-Based Arguments (72% of open-ended question respondents, $n = 56$), (2) Biological Arguments (64%, $n = 50$); and (3) Social and Ethical Arguments (24%, $n = 19$; Tables 1 and 2).

For those supporting relisting (Table 1), the majority of proponents (77%) offered Policy-Based Arguments, emphasizing the need to counteract wolf management policies in the western United States and that the ESA is the appropriate tool for doing so. Almost two-thirds of proponents (65%) offered Biological Arguments, including that wolves in the western United States were threatened or endangered; proponents also expressed concerns of losing ecosystem benefits of wolves and of exaggeration of their negative impacts (e.g., on big game populations). Twenty-five percent of proponents made Social and Ethical

Arguments, primarily referencing ethical concerns about current harvest practices and the socio-economic and cultural benefits of wolves.

For those opposing relisting (Table 2), 69% offered Policy-Based Arguments, including support for state rather than federal management. Opponents also argued that the ESA is not the correct tool to address state management plans and that the petition review was unwarranted given that population sizes of wolves in the western United States exceed ESA recovery goals and relisting protocols are in place if needed. Sixty two percent of opponents offered Biological Arguments, stating that wolf populations are not threatened by current levels of harvest or that wolves are a resilient species with robust and wide-ranging populations. Twenty three percent of respondents offered Social and Ethical Arguments, suggesting that proposed relisting is based on social desire and advocacy rather than scientific evidence.

4 | DISCUSSION

Our survey of authors of scientific publications on US wolves in the past 5 years indicated that a majority supported relisting gray wolves in the western United States on the ESA; support was driven by respondents from academic institutions. Most respondents disapproved of state management plans for wolves in Idaho and Montana and believed they pose a threat to wolf populations. Nearly half of respondents were unsure if population estimates of wolves in Idaho and Montana

TABLE 1 The arguments by category (bold) and underlying themes (*italics*) for those who supported relisting of gray wolves in the western United States on the Endangered Species Act

Policy-Based Arguments	77% (n = 40)
<i>Need to Address Western State Management.</i> For arguments that specifically referenced the need to counteract wolf management and harvest policies in the western United States	85% (n = 34)
<i>The ESA as the Correct Tool.</i> For arguments that related specifically to the ESA as the appropriate tool for protecting wolves or as the only recourse given the need to take immediate action	40% (n = 16)
<i>Funding and Resources.</i> For arguments that discussed how current levels of wolf hunting will waste prior funds and resources used in wolf conservation and recovery	3% (n = 1)
Biological Arguments	65% (n = 34)
<i>Impacts to Wolves.</i> For arguments that wolf populations are threatened or endangered. Such responses referenced three primary scales of impact, including the pack-level, the local or state level, and the regional or national level	94% (n = 32)
<i>Broader Ecological Impacts.</i> For arguments of losing ecosystem benefits of wolves and that wolves will not have negative ecological impacts (e.g., on game populations)	27% (n = 9)
Social and Ethical Arguments	25% (n = 13)
<i>Ethical Perspectives.</i> For arguments about the unfairness and cruelty of harvest practices employed in the western United States and how federal protection is needed to circumvent such unethical practices	85% (n = 11)
<i>Socio-economic and Cultural.</i> For arguments of general social and cultural benefits, such as wolves providing significant cultural value and wolves being a tourist attraction, as well as perspectives that wolves need federal protection until societal persecution is alleviated	31% (n = 4)

Note: Percentages (frequencies) listed for each category of argument are out of the total number of participants who supported relisting and responded to the open-ended question (n = 52). Percentages and frequencies reported for the themes within each category are out of the total number of responses that were coded for that category of argument.

were accurate and reliable and about a fifth believed they were not.

The primary argument for both proponents and opponents of relisting centered on policy perspectives,

TABLE 2 The arguments by category (bold) and underlying themes (*italics*) for those who opposed relisting of gray wolves in the western United States on the Endangered Species Act

Policy-Based Arguments	62% (n = 16)
<i>Support for State-Level Management.</i> For arguments in favor of state-level management and for those supportive of (or at least not concerned by) the harvest policies of the western states	69% (n = 11)
<i>Related to the ESA.</i> For arguments that the ESA was not the correct instrument to protect wolves or address western state harvest policies, or that the petition review is unwarranted given wolf population sizes exceed ESA recovery goals and relisting protocols are in place if needed	50% (n = 8)
<i>Funding and Resources.</i> For arguments that using resources and funds to protect wolves at the federal level is wasteful and will negatively impact other species that are in greater need of protection	13% (n = 2)
Biological Arguments	62% (n = 16)
<i>Lack of Impact to Wolves.</i> For arguments that wolf populations are not threatened or endangered and that wolves are a resilient species with robust and wide-ranging populations	100% (n = 16)
Social and Ethical Arguments	23% (n = 6)
<i>Social Desire not Science.</i> For arguments that the proposed relisting of wolves to the ESA is based on social desire and advocacy rather than scientific evidence	100% (n = 6)

Note: Percentages (frequencies) listed for each category of argument are out of the total number of participants who opposed relisting and responded to the open-ended question (n = 26). The frequencies and percentages reported for the themes within each category are out of the total number of responses that were coded for that category of argument.

typically regarding state versus federal management and if and how the ESA should be applied. For example, proponents and opponents who linked policy arguments about the ESA to biological arguments about degree of threat to wolf populations often offered fundamentally different explanations regarding the scale of impacts and relisting criteria. Proponents discussed impacts on wolves for individual packs, for localized or state populations, and for broader wolf populations at the regional or national level, often arguing that significant impacts at any of these scales may warrant federal protection. Alternatively, opponents more often argued that wolf populations in the western United States, or in the lower 48 as a whole, were not threatened and thus relisting was not warranted. Such interpretability of the ESA with

respect to geographic distribution has been critiqued for leading to inconsistencies in recovery goals and how they are applied across species, prompting continued legislation and lawsuits about legal protections (Bruskotter et al., 2014; Carroll et al., 2010; Carroll et al., 2020; Wolf et al., 2015).

In addition, social and ethical arguments made by both sides were contradictory. For example, proponents cited the recent legislation and harvest practices in Idaho and Montana as unfair, unethical, and unsportsmanlike. In contrast, opponents believed relisting decisions should not be based on social and ethical criteria, particularly by advocacy groups. The tension between value-based versus science-based approaches for decision-making about wildlife management is well documented in the literature (e.g., Lute et al., 2020a; Lute et al., 2020b; Manfredo et al., 2017; Nie, 2004). For example, Lute et al. (2020a) found that conservation professionals prefer that well-informed professionals (e.g., government biologists), and not the general public or legislators, make decisions about carnivore conservation, and prefer that management processes use a combination of science, local knowledge, and participatory decision-making. Exclusion of social perspectives from decision-making can provoke social resentment and can even result in ballot measures by the public and advocacy groups (Darinmont et al., 2021; Manfredo et al., 2017; Niemiec et al., 2020). Regardless of ESA listing status of wolves in the western United States, our results on the importance of social and ethical arguments on both sides of the issue point to the need for participatory processes that integrate stakeholders with diverse values in decision-making to reduce conflict over wolf management (Madden & McQuinn, 2014; Nie, 2002). Ultimately, ecological data alone are insufficient to fully inform policy decisions about wolf management given the question of if and how many wolves should be on the landscape incorporates social considerations and value judgments.

Our results also revealed the nuance of scientist perspectives, highlighting the complexity of the topic despite the binary nature of the policy decision as to whether to relist wolves in the western United States. Several respondents shared counterarguments to their positionality while describing their perspectives. For example, one proponent shared “I do, however, worry that relisting could backfire. People who dislike wolves can easily kill them, legally or not, and relisting (especially in the Northern Rockies) would only increase resentment and hatred of the species.” Another proponent shared “While the ESA is not an ideal tool for protecting recovering wolf populations, it is clear that there needs to be some sort of federal regulation/guidance to prevent states from ‘over-correcting’ in their lethal control/population reduction

measures, and to coordinate recovery at the regional level (beyond individual states) given the cross-boundary nature of wolf populations.” Additionally, an opponent of relisting discussed “I wanted to click both. I do not think a full relisting is needed but that it MAY be needed in these two states, pending how the year of harvest actually goes and what impacts it does or does not have on the populations.” A second opponent said “This is a difficult question to answer. While I find the current [lack of] harvest regulations in Montana, Idaho, and Wyoming abhorrent, I do not think that wolves are threatened to the point of being ‘endangered’ (i.e., at risk of extinction in the near future).”

We emphasize that the survey specifically focused on opinions on the USFWS 90-day finding petition review. Consequently, because the policy decision being considered by the USFWS is a binary choice to relist wolves and includes both Idaho and Montana, our survey intentionally posited a binary yes/no question regarding relisting and considered both states jointly. The survey also asked about acceptability of management plans in Idaho and Montana by directly quoting language in the USFWS document regarding the newly enacted wolf management legislation in each state. Further insight could be gained by evaluating scientist perspectives on the actual implementation of this legislation and the real-world outcomes of the resulting management plans in both states. For example, in Montana, despite a longer season and new methods of take, 273 wolves were harvested during the 2021–2022 season, less than in recent years, including a record number of 329 wolves harvested the prior season (MTFWP, 2022). However, as a result of the legislation, Montana also increased quotas for wolves in hunting districts north of Yellowstone National Park, which contributed to a record number of Yellowstone wolves killed in outside states during the 2021–2022 hunting season (19 in Montana, 4 in Wyoming, and 2 in Idaho; Yellowstone National Park, 2022); this eliminated over 20% of the Park’s wolves and prompted a public comment by the US Secretary of the Interior (Haaland, 2022). Soliciting additional expert opinion on the potential impacts of hunting mortality on the population sizes, ecological role, and ongoing scientific studies of Yellowstone wolves in particular would be informative.

Overall, the science-policy interface literature emphasizes that voices of scientists should be considered in conservation policy, given they are highly knowledgeable about issues related to policy decisions (Lewandowsky et al., 2013; Martin et al., 2012). Our survey allowed scientists to offer their expert opinion anonymously on the polarizing and politicized debate regarding wolf

management in the western United States. We note that the survey itself was not without controversy, as some recipients—and the colleagues with whom they discussed the survey—were displeased with the survey, with some suggesting that soliciting opinion on the USFWS finding was a form of “advocacy.” Such feedback relates to a broader discussion in the conservation literature on the role of expert scientific opinion in policy, with the concern that advocacy might damage perceived objectivity and hence credibility of scientists (e.g., Lackey, 2007; but see Kotcher et al., 2017). We conducted this survey with the belief that understanding of expert opinion and the factors driving it are critical pieces of information that can inform decision-making and improve conservation successes on complex and controversial issues (Driscoll et al., 2021; Garrard et al., 2016; Nelson & Vucetich, 2009). This process is illustrative of the challenges inherent in amplifying scientific opinions on controversial conservation issues, despite the pressing need to integrate scientific perspectives into policy decisions.

AUTHOR CONTRIBUTIONS

Kevin Crooks conceived and designed the survey, authored drafts of the paper, and approved the final draft. Mireille Gonzalez conceived and designed the survey, helped collect and analyze data, prepared tables, authored drafts of the paper, and approved the final draft. Benjamin Ghasemi conceived and designed the survey, helped collect and analyze data, authored drafts of the paper, and approved the final draft.

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CONFLICT OF INTEREST

The authors declare there are no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author (KC) upon reasonable request.

ETHICS STATEMENT

Final survey and administration procedures were approved by Colorado State University's Institutional Review Board (protocol #3181).

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SUPPORTING INFORMATION

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