

# The role of governance in rewilding the United States to stem the biodiversity crisis

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## Abstract

A critical but underattended feature of the biodiversity crisis is the contraction of geographic range experienced by most studied terrestrial vertebrates. In the United States, the primary policy tool for mitigating the biodiversity crisis is a federal law, the Endangered Species Act (ESA). For the past two decades, the federal agencies that administer the ESA have interpreted the act in a manner that precludes treating this geographic element of the crisis. Therefore, the burden of mitigating the biodiversity crisis largely falls on wildlife agencies within state government, which are obligated to operate on behalf of the interests of their constituents. We present survey research indicating that most constituents expect state agencies to prioritize species restoration over other activities, including hunting. This prioritization holds even among self-identified hunters, which is significant because state agencies often take the provisioning of hunting opportunity as their top priority. By prioritizing rewilding efforts that restore native species throughout portions of their historic range, state agencies could unify hunting and nonhunting constituents while simultaneously stemming the biodiversity crisis.

**Keywords:** biodiversity, Endangered Species Act, wildlife restoration

Humans have increased the rate of species extinction by approximately three orders of magnitude over the background rate (Pimm et al. 2014). Consequently, of roughly 40,000 known species of vertebrates, 20% are believed to be at elevated risk of extinction (Hoffmann et al. 2010). Those statistics are important and grim, but they also represent an inadequate understanding of the biodiversity crisis. Biodiversity loss is driven not only by worldwide extinction but also by the contraction of species' geographic ranges. Therefore, an adequate account of the biodiversity crisis requires due concern for the majority of studied terrestrial vertebrates having been extirpated from 60% or more of their geographic ranges (Ceballos and Ehrlich 2002, Ceballos et al. 2017). The cumulative effect of these contractions means that disturbingly large swaths of the Earth's land have lost substantial portions of their native biodiversity. For example, one study (Ceballos and Ehrlich 2002) showed that most native mammalian fauna, including common "species of low [conservation] concern," have been extirpated from more than 50% of the coterminous United States. Similar patterns are found across the planet.

The reason that biodiversity loss is a crisis is that species have ecological value—that is, important roles to play in protecting the health and function of native ecosystems—and they cannot fulfill those roles on lands from which they have been extirpated. The scientists who estimated the extent of species' range losses wrote (Ceballos et al. 2017),

"The strong focus on species extinctions, a critical aspect of the contemporary pulse of biological extinction, leads to a common misimpression that Earth's biota is not immediately threat-

ened, just slowly entering an episode of major biodiversity loss. This view overlooks the current trends of population declines and extinctions... We show the extremely high degree of population decay in vertebrates, even in common 'species of low concern.' Dwindling population sizes and range shrinkages amount to a massive anthropogenic erosion of biodiversity and of the ecosystem services essential to civilization. This 'biological annihilation' underlines the seriousness for humanity of Earth's ongoing sixth mass extinction event."

In summary, the biodiversity crisis has two facets, global extinction and range loss, and the latter facet has important and underappreciated consequences for the health and function of native ecosystems. But how can range loss be mitigated?

In response to such losses, some conservationists emphasize the need to spare or protect more lands from development and human disturbance through initiatives such as 30 × 30 (Baillie and Zhang 2018) and half-Earth (Ellis and Mehrabi 2019). Important as such initiatives may be, they are likely to be insufficient for addressing the widespread loss of biodiversity due to range contractions. In addition to protecting land, restoring imperiled species such that they fulfill their ecological roles across broad portions of their historic range is likely to require actively reintroducing species to areas they once occupied.

The effectiveness of restoration efforts will be shaped, in part, by how governments interact and share responsibilities across scales of government (Baynham-Herd et al. 2018). A failure to match scales of governance and restoration risks failing to adequately mitigate the biodiversity crisis. For example, federalism

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describes a common arrangement whereby power and authority are shared among federal (i.e., nation level) and regional (e.g., state, provincial) governments. As the mode of governance for Australia, North America, the European Union, much of Asia and South America, and a significant portion of Africa, federalism affects the responses to the biodiversity crisis across the globe. Federalism, like the restoration of biodiversity, is dependent on spatial scale. That is, some aspects of biodiversity restoration are better suited for treatment at the regional scale, whereas other aspects are better suited for national or international scales. For example, local governance can be especially well suited for taking account of circumstances particular to local jurisdictions, and broader levels of governance can be important for coordination of local efforts so that they may be effective at larger scales (Ekroos et al. 2017).

The implementation of scale-appropriate strategies is complicated when national politics influence support for aspects of biodiversity restoration that should be addressed at large scales. When this happens, regional governments are left with the burden of addressing aspects of the biodiversity crisis that are otherwise best suited for a federal government. In the present article, we explore such challenges by first examining recent policy actions of a key contributor to global biodiversity loss—the United States (Rodrigues et al. 2014)—that effectively reduce the federal government's role in restoring imperiled species. We then introduce the findings of recent survey research to examine how these policy actions align with state-level governance and the expectations of the constituents to be served by government.

## Mitigating the biodiversity crisis in the United States

The primary policy instrument for mitigating the biodiversity crisis in the United States is the Endangered Species Act of 1973 (ESA), and the federal agencies responsible for administering the ESA are the US Fish and Wildlife Service and the National Marine Fisheries Service (hereafter, collectively referred to as *the services*). The ESA creates an obligation to protect and restore only species that meet the legal requirements for threatened or endangered species. A threatened species is one that will become endangered in the foreseeable future, and an endangered species is one that is “in danger of extinction throughout all or a significant portion of its range” (16 USC. §1532).

In recent decades, the services' interpretation of the definition of an endangered species has been narrowed via a series of controversial regulatory changes (Nelson et al. 2016). Most importantly, in the mid-2000s the services began to assert that the term *range* in the definition of an endangered species refers only to a species' *current* range. Accordingly, species cannot be endangered in their lost range; rather, they are extinct. These regulatory changes severely curtail the utility of the ESA for mitigating species' range contractions. Despite nearly a dozen court cases rejecting this narrow interpretation over the past two decades, the services have persistently insisted on its use.

Unambiguous legal and ecological reasoning indicates that an adequate interpretation of the legal definition of endangerment includes species that have been extirpated from large portions of their historic range—even if the species is not in danger of global extinction (Vucetich et al. 2022). Although the reasons for the services' narrow interpretation are difficult to verify, their reticence to employ a more expansive interpretation may represent an unwillingness to oppose influential special interests, including but

not limited to the Republican Party's increasingly partisan opposition to environmental issues (Krugman 2022). Right or wrong, the services show no indication of moving toward an interpretation of the ESA that would make it relevant for combating a critical, underappreciated aspect of the biodiversity crisis. (For additional details on this issue, see Vucetich et al. 2006, Enzler and Bruskotter 2009, Greenwald 2009, Carroll et al. 2010, Kamel 2010, Bruskotter et al. 2014, and the references therein.)

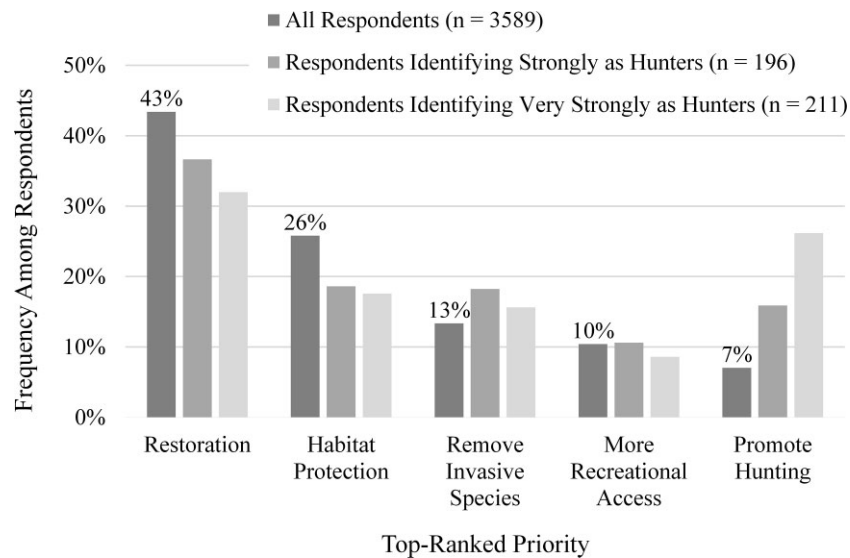
## State governments' role

The federal government's restrictive interpretation of *endangered species* likely constitutes an abdication of the responsibility to mitigate the geographic facet of the biodiversity crisis. This abdication creates a significant burden for the agencies within state governments that are charged with the conservation of fish and wildlife. In the United States, state governments typically claim ownership of wildlife on behalf of their citizens (Blumm and Paulsen 2013) and delegate the responsibility of managing wildlife to administrative agencies (Freyfogle et al. 2019).

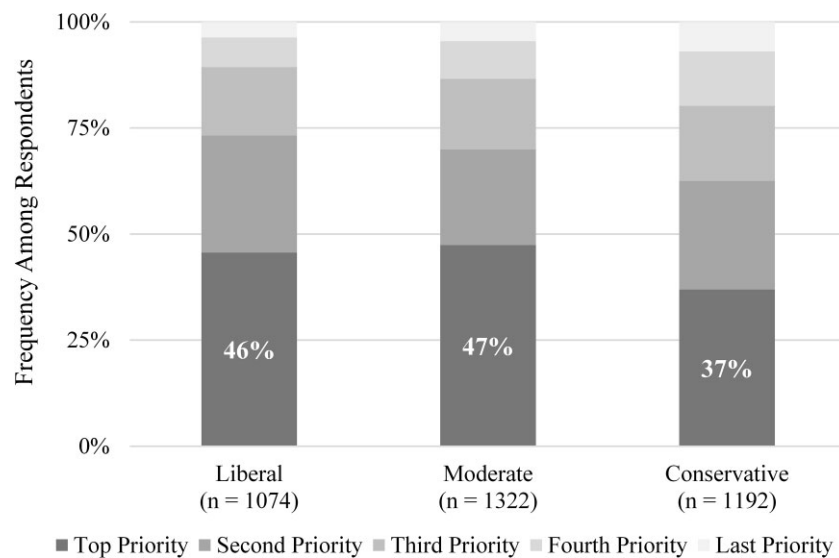
A key concern pertaining to this responsibility is that state agencies often act in ways that suggest they view their primary purpose not as the restoration of wildlife but, rather, as the provisioning of maximal recreational opportunities (e.g., to hunt or trap wildlife; Bruskotter et al. 2022). This perception seems clearly reflected in, for example, some agency mission statements indicating as much (Metcalf et al. 2021); philosophies that promote hunting as the goal of conservation, such as the so-called North American model of wildlife conservation, which is embraced by many state wildlife agencies (Nelson et al. 2011, Serfass et al. 2018); deep concern for declining rate of participation in hunting, especially among younger generations, and its associated revenues (Duda et al. 2022); a disproportionate allocation of effort to promote hunting, trapping, and fishing through the recruitment, retention, and reactivation of sportspersons (Gassett and Chase 2022); obstinate interest in hunting carnivores, as was indicated, for example, by proffering unfounded reasons to hunt carnivores (Vucetich et al. 2017); and the explicit forfeiture of restoration efforts in favor of other activities (Frischkorn 2016), despite promising feasibility assessments (Karns et al. 2015).

We hasten to emphasize two points for clarity: We are not concerned that state agencies value hunting; nor do we claim that state agencies do nothing to restore native wildlife. Rather, our concern is that, given the magnitude of the problem and the opportunity costs that arise when an agency has limited resources (time, funding, personnel), they do too little for the biodiversity crisis, and in comparison, they spend too much effort on the promotion of wildlife-associated recreation. In short, agencies tend to prioritize recreation over the restoration and conservation of wildlife.

State agencies are, however, in a sociopolitically opportune position to reprioritize their efforts. The reason to think so arises, in part, from a pair of related trends: the long-term decline in participation rates in hunting and fishing (US Department of the Interior et al. 2018) and a recently documented shift in public values concerning wildlife (Manfredo et al. 2020). Collectively, these shifts are challenging agencies to reenvision conservation efforts to be more consistent with the interests of changing publics (Sullivan et al. 2022). However, a critical question remains unanswered: What are these interests? Or put another way, how would the publics of states prioritize various types of conservation activities? This is the question that inspired the current inquiry.



**Figure 1.** Frequency of respondents giving top ranking to each of several actions they believe should be prioritized by state fish and wildlife agencies. The respondents were recruited through an online panel maintained by the commercial sampling firm, Qualtrics. The data collection methods were approved by The Ohio State University's Office of Responsible Research Practices (protocol no. 2021E1229) and are detailed in the supplemental materials.



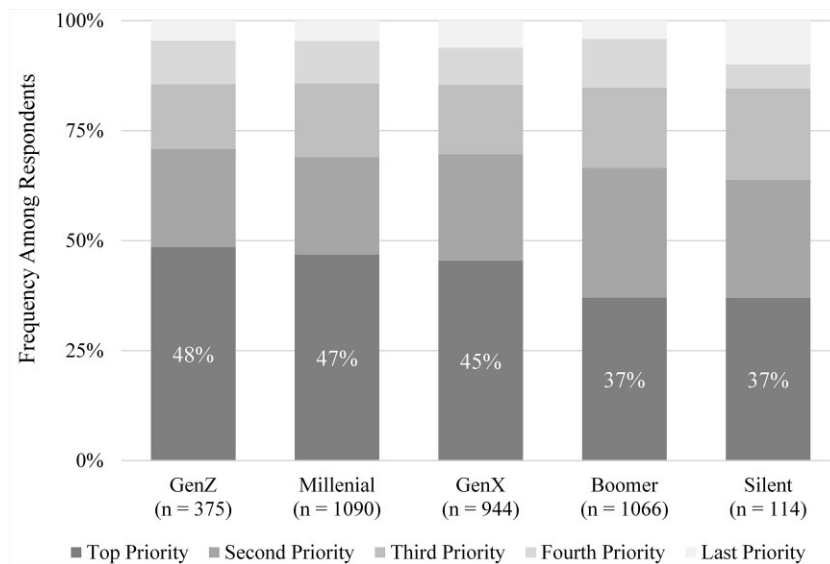
**Figure 2.** Prioritization of the restoration of locally extinct or imperiled species, among people of different political ideologies.

## Constituents' priorities

We conducted an online survey in which we sampled 3589 residents from nine US states: Colorado, Maine, Massachusetts, Minnesota, New Hampshire, New York, Pennsylvania, Vermont, and West Virginia. The survey participants were presented with a list of actions that are generally within the purview of state wildlife agencies and asked to prioritize that list according to which actions were most important to the respondent. The items on that list, which were randomized in terms of order of presentation, included the restoration of species that are locally extinct or imperiled, increasing opportunities to hunt or trap species, purchasing or leasing lands to create recreational access, management of existing lands to improve habitat, and the removal of invasive or exotic species.

The top-ranked priority was the restoration of species that are locally extinct or imperiled (hereafter, *restoration*; figure 1). Restoration was two to six times more likely to be top ranked than any other priority when considering the entire sample. Restoration was also top ranked among several key demographic groups within the sample. In particular, it was given top ranking by those who identified strongly or very strongly as being hunters (figure 1). Restoration was given top priority regardless of self-reported political ideology (figure 2). And the proportion of respondents identifying restoration as a top priority increased with decreasing age of the respondent (figure 3).

Although we were only able to sample the residents of nine states, there is good reason to believe that restoration would be prioritized by most residents in most states. Indeed, as was



**Figure 3.** Prioritization of the restoration of locally extinct or imperiled species, among people of different generational cohorts.

summarized in the prior paragraph, our results show that the key factors likely to influence attitudes about restoration, such as political ideology and participation in hunting, had little effect on prioritization (see figures 1–3). Moreover, the nine states we sampled capture much of the variance in wildlife value orientations (which represent the core beliefs about the relationship between humans and wildlife) observed across the 50 US states (Manfredo et al. 2020), and importantly, the prioritization of restoration did not vary significantly with state-level value orientations among the states sampled (supplemental figure S1). All data and analytic code supporting these findings are openly available in Dryad at <https://doi.org/10.5061/dryad.zgmsbccj7>.

## Reprioritizing biodiversity restoration across scales of governance

The services' narrow interpretation of endangered species likely constitutes an abdication of their duty to conserve threatened and endangered species. Perhaps more importantly, it surely negatively affects the ability to address the biodiversity crisis by creating a mismatch between the scale of the crisis and the scale at which state and federal wildlife agencies operate. This mismatch is illustrative of a broader pattern in American governance, which tends to leave states responsible for problems that require large-scale responses, as is evidenced by efforts to reduce greenhouse gas emissions (Wiener 2007) and slow the spread of COVID-19 (Probst et al. 2020). Although the mismatched scale stymies efforts to solve such problems, states can invest in the restoration of biodiversity at a level that is commensurate with the severity of the crisis. In fact, our work shows that constituents expect and prioritize such investment above and beyond other potential opportunities, including those related to recreation.

Democratic principles in conjunction with the expectations of constituents would seem to favor that state agencies prioritize the restoration of biodiversity. That restoration would be an opportunity for state agencies to better serve a larger portion of their diverse constituencies. The fact that state agencies currently prioritize other activities over concerns about the biodiversity crisis could be attributed, in part, to undemocratic influences of spe-

cial interests operating within state and federal governments (Nie 2004), which are often exacerbated by the bureaucratic inertia of state and federal agencies themselves (Berl et al. 2022).

The reprioritization of biodiversity restoration by state agencies will likely require substantial reform, whether supported by the acquisition of new funds or the reallocation of existing funds. Although no one-size-fits-all solution exists for such reformation, adaptive and systems-based (Berl et al. 2022, Jacobson et al. 2022) approaches may be especially useful. These efforts require more meaningful engagement with a wider range of stakeholders than has typically been the case. Therefore, if a state agency wanted to identify a broad activity that includes and potentially unifies hunters and nonhunters and that looks toward the future constituency of state agencies, our findings suggest that activity would be the restoration of native biodiversity.

But which species should be prioritized for restoration? Although numerous criteria could be used to prioritize restoration, we suggest two that would be especially useful: ecosystem function and feasibility of success. The former could be focused on returning lost functionality (e.g., predation; Brodie et al. 2018). The latter is more complicated and might, in fact, employ multiple criteria. For example, public support for (or at least a lack of opposition to) restoration is one aspect of feasibility; a second is a species' ability to persist, which might, for example, favor generalist species with the ability to adapt to changing social and ecological conditions. Relatedly, a third factor could be a species' ability to reoccupy a former range, thereby expanding biodiversity and returning lost functionality to a greater overall area. Examples of species for which restoration is readily feasible include gray wolves (*Canis lupus*; Ripple et al. 2022), beaver (*Castor canadensis*; Ripple et al. 2022), bison (*Bison bison*; Harms 2022), and mountain lions (*Puma concolor*; Yovovich et al. 2023).

Finally, framing the biodiversity crisis as a top concern of governments' constituents is a necessary but insufficient condition for mitigating the biodiversity crisis. Other challenges remain, such as the politics of taxation and budgeting (Duda et al. 2022), state commissions (Nie 2004), and land regulation (Chapman et al. 2023). Nevertheless, our assessment provides important insights regarding the role of governance in rewilding efforts in the United States, and the implications of rewilding in the United States

would likely extend far beyond its borders. After all, compared with many other nations, the United States has disproportionately contributed to worsening the biodiversity crisis (Rodrigues et al. 2014) and has far greater wealth, making it more able to mitigate the biodiversity crisis, but contributes less than its fair share to fighting the biodiversity crisis (Lindsey et al. 2017). Given the need for more equitable allocations of responsibility for mitigating the biodiversity crisis (Sun et al. 2022), we encourage similar inquiries about the nature of conservation via multilevel governance in other regions of the world. Such inquiries will likely reveal new applications of social science to large-scale conservation that has varying effects across local jurisdictions.

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## Author contributions

Shelby C. Carlson (Conceptualization, Data curation, Formal analysis, Methodology, Resources, Software, Validation, Visualization, Writing – original draft, Writing – review & editing), John A. Vucetich (Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing), L. Mark Elbroch (Conceptualization, Data curation, Funding acquisition, Investigation, Project administration, Resources, Supervision, Writing – review & editing), Shelby Perry (Conceptualization, Data curation, Funding acquisition, Investigation, Project administration, Supervision, Writing – review & editing), Lydia A. Roe (Conceptualization, Data curation, Funding acquisition, Project administration, Resources, Writing – review & editing), Tom Butler (Conceptualization, Data curation, Funding acquisition, Investigation, Project administration, Resources, Supervision, Writing – review & editing), and Jeremy T. Bruskotter (Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing)

## Supplemental data

Supplemental data are available at [BIOSCI](#) online.

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