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Building a systems framework to facilitate adaptive organizational change in state fish and wildlife agencies

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Abstract

State fish and wildlife agencies in the United States are confronted with the realities of a rapidly changing society. With declines in historical sources of

The author's statement of how have placed the literature in context is: We place this work in context by drawing upon prior research on human values toward wildlife and societal change, organizational issues within wildlife management agencies, and prior work by and for wildlife agencies on the need for adaptive transformational change.

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revenue and the growth of diverse voices with values that differ from those emphasized by traditional policies and user groups, agencies are faced with diminishing relevancy and are encountering institutional challenges that inhibit their ability to serve the broader public. Here, in collaboration with a group of fish and wildlife agency leaders from 11 states, conservation professionals, and academics, we employ qualitative methods and concepts from systems theory to develop an integrative model of a state wildlife agency. We use this model to identify leverage points to induce transformational change toward an ideal future state: one driven by a system of shared values toward wildlife and a mission to improve quality of life for all people. Our findings point to the importance of developing interventions that will lead to changes in agency culture, systems of governance, and policy and action, and enhance the accessibility of natural resources and opportunities for diverse publics to engage with and benefit from fish and wildlife. We offer recommendations for state wildlife agencies to engage in adaptive organizational change and for university programs to support agency needs.

KEYWORDS
cultural change, human dimensions, natural resource management, organizational change, organizational culture, social change, state fish and wildlife agencies, systems change, systems theory

1 | INTRODUCTION

1.1 | Role of wildlife agencies and a changing society

With over a century of history since their origins, state fish and wildlife agencies in the United States (hereafter "state wildlife agencies") are tasked with restoring and sustaining healthy fish and wildlife populations and their habitats. As they emerged, state wildlife agencies practiced a management ideology consistent with the predominant values of the public at the time (Organ et al., 2012), though many were excluded from this process or have had their contributions to wildlife conservation minimized (Eichler & Baumeister, 2018; Nelson et al., 2011). Agencies developed with strong support from a core constituency of hunters and anglers and operated on a user-pay funding model that provided resources for the array of management responsibilities they were tasked with upholding (Geist et al., 2001). This traditional model evolved into a powerful institution with foundations in Western science and a system of norms that supported the bonds between agencies, their traditional users, and policy makers (Gill, 2004).

Following World War II, the emergence of dramatic sociocultural change in the United States began to present adaptive challenges for the management institution (Manfredo, Teel, Carlos, et al., 2020). These changes became apparent through a sustained decline in participation in hunting and angling by the public. In 1975, according to the *National Survey of Fishing, Hunting, and Wildlife-Associated Recreation* (U.S. Department of the Interior et al., 2018), approximately 10% of the US population hunted (17.1 million people, age 12 years and older) and 24% fished (41.3 million). By 2016, only 4.5% hunted (11.5 million, age 16 years and older) and 14% fished (35.8 million). This decline in participation has had a significant impact on funding for agencies, given that operational funds are directly tied to revenue from license sales and taxes on sporting goods. Overall, there has been a 1.4% decline in hunting license revenues and a 5.4% increase in fishing license revenues (adjusted for inflation) since the year 2000 (U.S. Fish and Wildlife Service, 2019); however, these amounts vary considerably by states. While some states have enjoyed an increase in overall license revenues (including Washington, Virginia, and North Dakota), others have seen revenues decline by 30% or more (such as West Virginia, New Jersey, and Massachusetts). There are many factors that affect license sales (e.g., price, license availability, etc.), but the net effect has been a growing deficit in the amount of resources available for the increasingly difficult and costly challenges of managing wildlife and mitigating human–wildlife conflict.

1.2 | Forces behind sociocultural change

A collaborative, nationwide program of research has developed a sociocultural explanation for the observed changes in the nature of human interaction with wildlife in the United States. Two key studies, the 2004 *Wildlife Values in the West* survey (Teel et al. 2005) and the 2018 *America's Wildlife Values* survey (Manfredo et al., 2018), provide a long-term examination of the roots of human values toward wildlife and their ongoing societal shift.

Prior work has established the existence of two primary value orientations toward wildlife: traditionalist (or domination) wildlife values are related to the subordination of wildlife to human interests and the use of wildlife for economic benefit, while mutualist wildlife values see wildlife as part of the social community that are worthy of rights and protections (Manfredo, Teel, Carlos, et al., 2020). Findings from ongoing research on wildlife values have shown that mutualism is associated with low and declining participation in hunting and angling as well as lower support for management practices involving lethal control (Manfredo et al., 2018), and that values are shifting toward mutualism across the American West due to social forces including urbanization and economic development (Manfredo, Teel, Berl, et al., 2021). All Western states except North Dakota and Wyoming have shown declines in the proportion of traditionalists, but some states have witnessed particularly high losses of this value type (e.g., Arizona, Oklahoma, Utah, California, and Idaho), with corresponding gains in the proportions of mutualists.

The *America's Wildlife Values* study also included a focus on the internal culture of state wildlife agencies (Manfredo et al., 2018, pp. 8–12, 67–78). Results showed a unity of purpose and dedication to the mission of wildlife management. For example, the vast majority of employees (>80%) see their role—as protectors, experts, and stewards of wildlife, and being compassionate about wildlife—as core to their agency's values. Moreover, they feel it critical to uphold the values of the agency and be "model employees." However, while these characteristics lead to strong cohesion and unity within agencies, the inertia of strong internal cultural traditions means change to those traditions is slow and difficult. For example, when asked about the ideal role of the public in decision-making, none of the agencies surveyed embraced a model of decision-making in which non-traditional stakeholders were empowered in the decision process. Moreover, the value profile of agencies is comprised of a majority of traditionalists (64%) and a stark minority of mutualists (7%), standing in contrast to the composition of value types in the public, which are roughly equally divided between mutualists (33%) and traditionalists (30%). The mismatch between the ongoing value shift toward an increasingly mutualist public and the stability of traditional values within agencies poses a hurdle to agencies looking to embrace change and engage new users and stakeholders who may not fit their own value profile.

1.3 | Responding to the challenge of sociocultural change

While there have been repeated calls for change in the wildlife management institution over the past four decades (Heberlein, 1991; Peyton, 2000; Todd, 1980; Wagner, 1989), transformational change is notoriously difficult for any organization to achieve (Kee & Newcomer, 2008). A fear of change and the reluctance to implement clear and comprehensive new policies can result in resistance, both internally and externally, that blocks the success of change initiatives (Erwin & Garman, 2010; Gigliotti et al., 2009). However, in the absence of any adaptive measures, agencies face the prospect of severe financial cutbacks, failure to fulfill their mandates, and diminished relevancy for society (Jacobson et al., 2010). Therefore, the need for agencies to implement policies and practices that allow them to better serve the demands of a changed and changing society, and to maintain relevancy in the face of that change, is becoming increasingly urgent.

To respond to this need for change, initiatives by the Association of Fish & Wildlife Agencies (AFWA) and other organizations, such as the Blue Ribbon Panel on Sustaining America's Diverse Fish and Wildlife Resources (2016) and the Fish and Wildlife Relevancy Roadmap (Association of Fish and Wildlife Agencies & The Wildlife Management Institute, 2019), have been undertaken in recent years. Of these two initiatives, the former focused on broadening funding sources for agencies and on learning how best to engage in adaptive transformation, while the latter was an effort to identify strategies to address barriers to agencies' ability to adapt, including agency capacity, agency culture, constituent capacity, constituent culture, and political constraints. To support and follow through on the recommendations of these previous initiatives, we focus on the opportunities for change presented by illuminating specific mechanisms within the organizational structure of a state wildlife agency that could be engaged to drive transformational change. Our project treats the barriers identified by previous initiatives as arising from common causes that can be addressed using a coordinated, integrative approach across the agency as a whole, rather than by trying to solve each problem separately and

sequentially. Our findings complement the conclusions of previous projects that have identified the need for agency change and the barriers that stand in its way, and contribute to a more complete picture of the needs and responsibilities of agencies in the complex process of organizational change.

1.4 | Viewing wildlife agencies as systems

To examine the operation of a complex institution such as a state wildlife agency and assess its potential mechanisms for change, we adopt a framework based in systems theory that provides a detailed, integrative view of organizations. Systems theory, a broad theoretical tradition that is widely used across modern sustainability and human dimensions research as well as many other interdisciplinary social science approaches (frequently, as social-ecological systems), provides such a framework (Chan et al., 2020; Holling, 2001). A system is a pattern of interacting elements that form a coherent whole (Mele et al., 2010; von Bertalanffy, 1968), so treating an organization as a system allows it to be analyzed at different hierarchical levels of structure, from the bounded system in its entirety to its constituent subsystems and down to the smallest individual elements that compose the system. Within the structure of an organization, systems theory focuses on the interactions, interdependencies, and feedbacks between different elements of the system, and recognizes the effects of stakeholder attitudes, values, and beliefs in forming stable long-term norms (Foster-Fishman et al., 2007; Mele et al., 2010). The strength of using systems theory for organizational change is the ability to illustrate and disentangle complex interconnected organizational operations and enable the targeting of crucial points of intervention (Dooley, 1997). Two primary benefits of this approach for the goal of systems change are the ability to visualize interactions between the different parts of the system, which can otherwise be difficult to assess (Foster-Fishman et al., 2007), and to identify the most effective leverage points for action (Meadows, 1999).

Leverage points are "places within a complex system...where a small shift in one thing can produce big changes in everything" (Meadows, 1999, p. 1). In other words, leverage points are elements of the system that, when changed, have reinforcing effects due to their position as part of one or more feedback loops that propagate the impacts and benefits of that change through the system. Leverage points are critical to strategically planned systems change efforts, yet ours is the first study to seek to identify leverage points for change within state wildlife agencies. Our aim is to identify critical, high-value leverage points and specify processes by which those levers can be engaged in order to assist agencies in envisioning and achieving their desired future through systems change.

2 | METHODS

To accomplish our objective, the research group (authors 1–6) engaged directly in a collaborative research effort with, by, and for a group of state wildlife agency leaders, conservation professionals, and academics. We report details of our qualitative research methodology in line with recommendations by Taylor et al. (2015, pp. 202–203). We gathered data over the course of two workshops held at Colorado State University: the first workshop involved 8 h of structured discussions over 2 days in August 2019, and the second was 12 h over 2 days in January 2020. State wildlife agency leaders were invited on the basis of their participation in or leadership of prior initiatives focused on the need for adaptive change, either within their own states or as contributors to projects such as the Fish and Wildlife Relevancy Roadmap. The wildlife agencies of 11 states were represented: Colorado, Connecticut, Florida, Maine, Missouri, Nevada, Ohio, Oklahoma, Oregon, Rhode Island, and Texas. These states, each with their own unique constituencies and challenges, represented a diverse slice of wildlife management across the United States. Representatives of national wildlife organizations and of university programs engaged in natural resource and conservation science, outdoor recreation, and wildlife biology were also invited to participate and share their views and expertise, for a total of 14 participants and 6 research group members across both workshops. All participants were familiar with the researchers and their prior work and knew each other from past interactions and networks. All contributors to the study—including the researchers—were white, 35% were female, and the group held a range of views and values toward wildlife across mutualist and traditionalist perspectives. Participants shared their reasons for taking part in the project, which were primarily based in: a recognition of the urgent need for change and for state wildlife agencies to position themselves on the forefront of that change; an interest in using the best available social science to retain relevancy and connect agencies' work and mission with non-traditional publics; a desire to explore more diverse funding mechanisms and engage new customers; and an interest in meeting the needs of agencies in the future by developing new curricula and providing training in crucial skills.

The objectives of the first workshop were to examine—at a broad level—the problem and need for agency change, and to create a picture of a desired future for agencies. This task involved identifying a vision of a thriving agency and determining the changes needed to reach the desired state. Over the course of the workshop, participants engaged in full-group and breakout discussion sessions and activities focused on agency goals, key areas for change, specific needs, and prioritization of those needs. Using qualitative research strategies for semi-structured focus group interviews (Rabiee, 2004), we gathered data on these topics and probed into the connections between the issues currently facing agencies and goals for organizational change. Using notes from these discussions, the researchers synthesized and classified the qualitative results into thematic categories and used them to prepare for the second workshop where those ideas could be refined and organized for further data collection and analysis.

In our second workshop, to dig more deeply into the potential for organizational change within state wildlife agencies and approach institutional challenges, we relied on a systems theory perspective and real-time cognitive mapping of participants' responses to build upon our prior results and collaboratively develop an integrative systems model of a state wildlife agency (Ackermann et al., 1992; Eden, 2004; Foster-Fishman et al., 2007). This involved graphically depicting the elements of the agency as an interconnected system and determining the directionality of interactions between elements and the flow of their effects in reinforcing or inhibiting the operation of the system. The same group of participants from the first workshop were invited to return, with additions from academic and wildlife conservation organizations to expand collaborative opportunities across educational and training programs. With facilitation by the researchers, participants connected the key areas for change identified in the first workshop and expanded them to build a detailed model of a "typical" state wildlife agency. This process unfolded in four steps. First, the group was reminded of the vision of a desired future goal developed in the first workshop and asked to consider the benefits of that future state for both current users and a broader coalition of future stakeholders. Second, the group focused on identifying interconnected elements that either reinforce or inhibit the function of current agencies in achieving that goal. Third, small groups expanded on specific subsystems from the overall model, adding detail and determining important connections and feedback loops. Finally, participants identified elements that could serve as potential leverage points for change in the system, and created a second version of the system showing an ideal, transformed agency.

Participants collaborated with researchers in reviewing and synthesizing the data, reviewed drafts of the results and the written manuscript, and approved all summaries and interpretations of the data as true and accurate depictions.

3 | SCOPING THE CHALLENGE OF AGENCY CHANGE

What would a thriving agency look like? In the first workshop, we engaged in an open discussion of this question in which we identified a number of end-state aspects that summarize our vision of a sustainable state wildlife agency in the future (see Table S1). Based on these aspects—which describe an agency that successfully balances the needs of all constituents and the needs of the environment—we sought to identify areas of opportunity for change within current agencies that would be critical for reaching that vision. Discussion resulted in the determination of five key areas that would need to be addressed in an organizational change context: (1) *Mission, vision, and values*, which are core to an agency's purpose, identity, and engagement with the public; (2) *Diversity*, which includes the internal diversity of staff in terms of demographics and representation, but also the diversity of values and views held within an agency's internal culture, the diversity of offerings made available to the public, and the diversity of individuals and groups engaged by those activities; (3) *Funding*, including where funding comes from and how funding is used by the agency; (4) *Change management*, actively addressing resistance among staff and traditional constituents to agency change efforts; and (5) *Science and technology*, building upon agency expertise and foundations in science and broadening the agency's technological toolkit. Within each of these areas are many specific needs that currently exist within agencies (for a full list, see Table S2). The key areas and the general thematic domains for opportunities that can be taken to address needs within those areas are:

1. *Mission, vision, and values*: broaden current mission; clarify vision and values; engage in strategic planning;
2. *Diversity*: improve internal diversity; address internal culture; diversify external offerings to public;
3. *Funding*: acquire alternative funding; manage political structure; optimize use of funding;
4. *Change management*: facilitate internal agency change; open engagement and interactions with public;
5. *Science and technology*: maintain science focus; embrace new technology and develop technical capacity.

Among these five areas for change, participants were asked to identify their top three priorities. Two of these key areas—*Mission, vision, and values*, with 13 votes, and *Diversity*, with 9 votes—were identified by participants as the most urgent and important to address, and this was confirmed in follow-up conversations. *Funding* followed, with 7 votes, and *Change management* received 1 vote. *Science and technology* received 0 votes and, although participants commented that it would be an important area for change, it was seen as lower priority and less urgent than other concerns.

4 | BUILDING A MODEL FOR SYSTEMS CHANGE

During early discussions in the first workshop focused on envisioning a thriving agency, participants noted that they shared dual mandates to, first, provide opportunities for public engagement and participation in natural resources and, second, manage those resources for the benefit of the public. One agency leader offered that "we are in the business of quality of life." The role of state wildlife agencies in providing quality of life benefits through their responsibility to hold natural resources in public trust for current and future generations emerged as a structuring principle that provided a foundation on which to build in subsequent discussions. Rather than regarding a focus on quality-of-life benefits as conflicting with or extending beyond existing agency mandates, our group used it as a lens to reframe the role of a state wildlife agency in our present society, as well as a means by which an agency's success in fulfilling its responsibilities to the full diversity of its constituents can be gauged. Participants determined that the foremost aspirational goal for a thriving agency, then, is *to improve quality of life for all people.*

In our second workshop, we centered discussions on this goal: to extend an agency's quality of life benefits to a broader segment of the public than its traditional users, thereby improving its ability to achieve its mission and to retain and expand its relevancy. Our first step in this process was to collectively describe the broad array of the ways in which agencies contribute to people's quality of life today. These contributions are listed in Table S3, and span across many areas of society and human experience. Notably, in addition to services provided to traditional users, many benefits are presently being generated for individuals that would be considered non-traditional users of wildlife or current non-users of wildlife (i.e., members of the public that do not actively participate in wildlife-related recreation). Among these are a number of passive benefits—such as improvements to air and water quality, food systems, and mental health—that are generated through effective agency management practices and that directly or indirectly improve quality of life for present constituents, regardless of participation, and for future generations.

We then engaged in the task of developing a systems map that would represent how a "typical" state wildlife agency presently operates in delivering benefits to quality of life. The fully detailed model (depicted in Figure S1) includes all system components discussed by participants. Interactions flow directionally from one component to another, with positive interactions that reinforce the operation of the current system and negative interactions that inhibit the current system. The terms "positive" and "negative," therefore, refer to how interactions affect the flow of inputs and outputs through the system and not moral judgments about the components or their effects. The group did not assign specific numeric weights to interactions, since the purpose of this exercise was to build a generalized qualitative model rather than a quantitative one (Gray et al., 2013).

After developing this detailed model, we then made modifications to enhance its conceptual understandability and utility, to simplify and condense sets of complex interactions, and to integrate feedback from subsequent discussions later in the workshop (Figure 1). In this simplified version of the systems map of a present-day agency, there exists a primary self-reinforcing loop through the major subsystems wherein:

1. Users and funding: traditional users of natural resources (e.g., hunters, anglers, and, increasingly, recreational shooters) provide a significant proportion of agency funding through the purchase of licenses and sporting goods.
2. Agency culture: traditional sources of funding create an unspoken obligation toward and identification with traditional users which, along with a staff whose values are consistent with those of traditional users, generates and maintains an internal agency culture geared toward serving those users.
3. Governance: governance structures aligned with internal cultural attitudes that prioritize traditional users are put into place and reinforced.
4. Policy and action: avenues of potential policy and action are restricted to traditional users based on agency governance structures.
5. Accessibility and opportunity: the agency provides services that make natural resources more accessible and available to traditional users, who then provide agency funding through their activities.

As a result of this cycle, traditional users reap a larger share of the quality of life benefits available from public

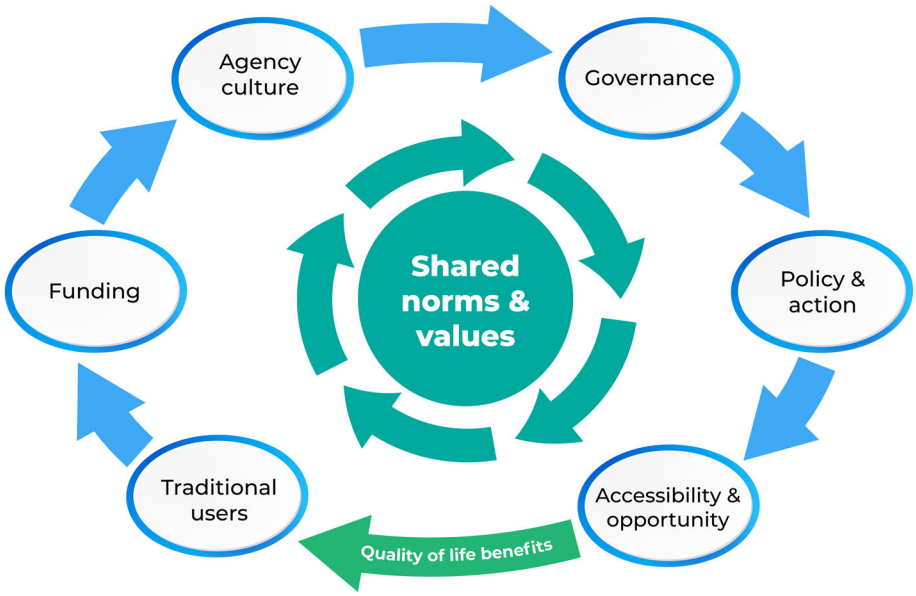

FIGURE 1 Simplified, integrative systems map of a "typical" wildlife agency, in its current state. Blue arrows indicate positive (reinforcing) interactions. Quality of life benefits (in green) are inequitably provided primarily to traditional users through restricted accessibility and opportunity. The system is reinforced by shared values, norms, and practices (in teal) that emphasize traditional uses of wildlife and traditional forms of wildlife-based recreation

resources (Table S3). The system as a whole is continually reinforced by an undercurrent of shared cultural values, norms, and practices surrounding the role and appropriate use of natural resources, arising from the extensive influence of traditionalist wildlife values across all of its different components.

Using the model of the present state of a "typical" agency, the group next developed a model of the agency's ideal future state, portrayed in Figure 2. This represents the goal of the organizational change effort as envisioned by agency leaders, to be achieved by effectively manipulating leverage points for change. In this model, quality of life benefits are provided equitably (not equally) to traditional users, non-traditional users, and current non-users. Stepping through the model in the same fashion as the previous, present-day model, we envision that:

1. Users and funding: agency funding draws significantly from a diversity of user groups and a wide portfolio of alternative funding sources.
2. Agency culture: agency culture is less tied to perceived obligations toward any particular user group or funding stream, and is instead composed of diverse viewpoints, values, uses, and experiences regarding wildlife, the outdoors, and the role of a state wildlife agency.
3. Governance: changes in the agency's governance structures are influenced by its more inclusive internal culture, and have implemented institutionalized changes to support and empower diversity.
4. Policy and action: policies and actions undertaken by the agency focus on a broader conception of quality of life and the benefits afforded by wildlife management, and on a consideration of who benefits and who is harmed by management action.
5. Accessibility and opportunity: an understanding of the demands of different user groups and of non-users regarding natural resources and outdoor recreation leads the agency to develop infrastructure and enact management that enables greater accessibility and creates new opportunities for all.

In this system, quality of life benefits are created for a more diverse set of users through the influence of proximate factors that increase and extend accessibility and opportunities provided by the agency. This idealized system has been reached by gradually replacing the underlying traditionalist-focused values, norms, and practices shared between agency staff, traditional users, and policy makers with a shared vision of the agency's mission to improve quality of life for all people. The changes that led to this shared vision are ultimately driven by the acceptance of a diversity of people, values, and ways of knowing throughout the system, with a remade agency culture at the core.

5 | FOCUSING ON SUBSYSTEMS AND IDENTIFYING LEVERAGE POINTS FOR CHANGE

In our discussions of potential areas of organizational change within wildlife agencies, our group sought to identify interactions, feedback loops, and points in the system that could be manipulated by agencies as leverage points to create lasting transformational change. In doing so, we selected and expanded three subsystems from the overall systems map that we identified as most critical for this effort. The first subsystem expands the concept of agency culture, the second involves the interrelated elements of an

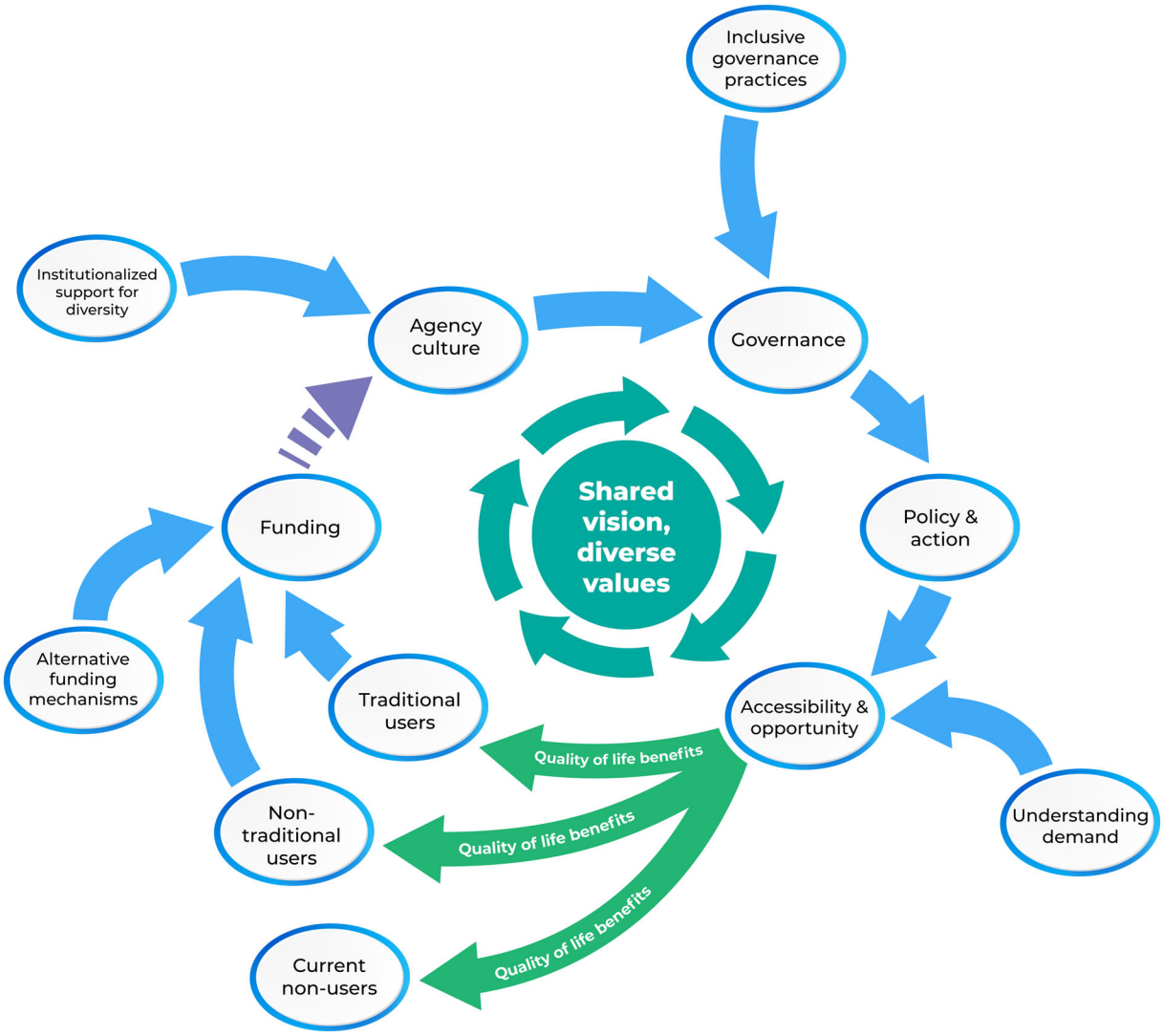

FIGURE 2 Simplified, integrative systems map of a thriving wildlife agency, in its ideal future state. Blue arrows indicate positive (reinforcing) interactions. Additional pressures on existing components of the system have led to changes that enable quality of life benefits (in green) to be provided equitably to traditional users, non-traditional users, and current non-users, through enhancements to accessibility and opportunity for all. The dotted arrow (in purple) from funding to agency culture indicates the reduced influence of funding sources in shaping an agency culture that serves traditional funders above other users. The system is reinforced by a shared vision of wildlife management and acceptance of the diversity of values among all stakeholders

agency's governance and its means for policy and action, and the third focuses on accessibility of resources and opportunities as the most proximate determinants of the quality of life benefits provided to constituents.

5.1 | Changing agency culture and building institutionalized support for diversity

There was broad agreement in our group that agency culture (Figure 3) is the most critical piece for driving and maintaining systems change within an agency. The internal culture of an organization is "the way we do things around here"; it is a system that embodies the organization's norms, values, and assumptions and continually signals to employees which kinds of behavior and which kinds of people are welcome, and which are not (Martin, 2006). We concluded that agency leadership in particular takes a central role in shaping the fabric of the agency by managing its staff and priorities and in setting the tone of its culture. With this view in mind, we were able to identify a number of high-value potential leverage points that are readily accessible to agency leaders. For a more detailed and integrative discussion of agency culture change using this model, see Jacobson et al. (2021).

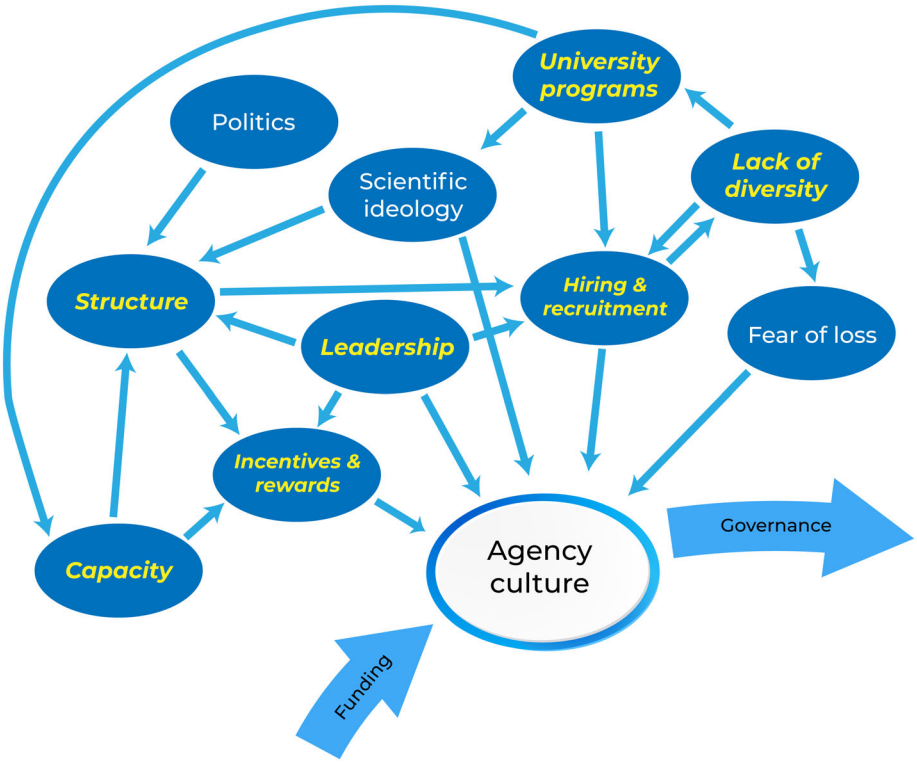

FIGURE 3 Focused subsystem map of agency culture within a "typical" state fish and wildlife agency, in its current state. Blue arrows indicate positive (reinforcing) interactions. For clarity, negative (inhibiting) interactions are not depicted. Components with emphasized orange text indicate potential leverage points for change

Firstly, lack of diversity is a primary contributor to many present issues with agency culture and the prospects for instituting change. Diversity as we use it here is all-inclusive: it means diversity of ethnicity, race, and ancestry, of language, gender, sexual orientation, and values, and of all other demographic, psychographic, and cultural traits that determine a person's identity and their relationship with wildlife and the outdoors. An agency's staff is the product of its hiring process and the priorities and values involved in that process, as well as the available pool of recruits from university programs, all of which are affected by perceptions of the current culture within agencies and in turn determine the diversity of the agency. An agency's staff should ideally resemble the constituencies that it serves in order to best represent their interests; however, at present, agency employees tend to be white men that maintain traditionalist values, while the general population of most states continues to shift toward mutualist values and greater ethnic and cultural diversity. Negative perceptions of agency culture, created by the culture's exclusionary practices, often drive more diverse qualified candidates to alternative positions such as those in international and non-governmental organizations. The resulting pool of applicants for agencies reinforces the belief that people that fit the traditional mold are the only ones interested or qualified to serve in the agency and advances the tendency to hire those candidates to fit the existing culture. Efforts to recruit a diverse staff will inevitably fail to retain them if the culture of the agency is not also rebuilt to be inclusive of diversity, with structural supports and meaningful influence on decision-making.

One of the greatest challenges for agencies to overcome in transitioning to a more diverse staff and a more inclusive culture will be the fear of loss of traditional values—both internally among their existing employees and externally among traditional users and organizations that support those users. Agencies themselves may also fear a loss of support from traditional users if their priorities change or are perceived to change. Sudden shifts in priorities are improbable; a long-term strategy could be led by purposeful changes to hiring processes, incentives and rewards for diverse perspectives and expertise, and an organizational structure that places new initiatives as central to agency function, which together can gradually bring in a broader representation of public interests while retaining the support of traditional user groups.

Improving the internal diversity of an agency will allow it to expand its external diversity in the form of the programs and services it has the ability to provide. The key goal is to embed support for diversity within the agency as an institution, so that the cascading benefits of diversity as a leverage point can be fully realized in other parts of the system, such as increases in public engagement, public support, alternative funding, and improved program outcomes.

Agency capacity is another important leverage point within agency culture that can be addressed directly

through changes to hiring, funding, and partnerships with other organizations. Hiring staff with a broader base of skills than strictly wildlife biology—skills in areas such as public communication, social science, leadership, business, and marketing—is a crucial part of building a staff with expertise in the problems that they typically encounter in the modern day-to-day performance of their duties, and for tackling new issues that arise from social change.

Funding determines an agency's operational ability and staffing, and is thus a critical input to the system and a critical influence on agency capacity. The process of seeking and integrating new and diverse streams of funding is beyond the scope of our discussion, but has been addressed by other research (e.g., Jacobson et al., 2007) and by the Fish and Wildlife Relevancy Roadmap (Association of Fish and Wildlife Agencies & The Wildlife Management Institute, 2019). Potential funding boons provided through legislative action, such as the Recovering America's Wildlife Act (Dingell, 2021; Heinrich, 2021), would provide the opportunity to implement many of the changes we recommend here much more quickly and smoothly, with less pressure to reallocate scant existing funds. However, we feel it is important to affirm that we believe organizational change is attainable with or without significant increases to existing funding prior to initiating change efforts. At least one state wildlife agency facing a loss of funding has already demonstrated significant success in this process (Pauley et al., 2021). It is also possible that such a boon in funding could instead be seen as justification that immediate change is not so urgent, or that agency change may never be needed, thereby merely prolonging and exacerbating the issues that have led to the present state of urgency.

Finally, the creation of collaborative relationships and partnerships with other organizations can increase an agency's capacity by leveraging the influence and resources of organizations and individuals that share common goals with agencies in preserving wildlife and improving quality of life for people. Embracing the systems concept of "One Health" (Zinsstag et al., 2011)—that healthy ecosystems lead to healthy people, and that human health and quality of life are dependent on healthy fish and wildlife populations—allows a broader view of a wildlife agency's mission and its responsibilities to the public. This opens up opportunities for collaboration with public health agencies, health care providers, therapy programs, educational institutions, sports leagues, public figures, philanthropic foundations, public utilities, food producers, tribal nations and communities, and others that may not have been considered under the traditional model of wildlife management or may take on additional dimensions when a broader concept of health and well-being is considered.

5.2 | Finding opportunities in governance and in policy and action

Governance is what we refer to broadly as a system of "practices and procedures that determine how decisions are made and implemented, and how responsibilities are exercised" (Decker et al., 2016, p. 291). In the context of a state wildlife agency, governance includes all of the institutionally embedded processes that influence management policy and action on a natural resource issue (Armitage et al., 2012; see also Sullivan et al., 2021). Agency culture has a great deal of downstream influence on agency governance and on the policy and action undertaken by an agency (Figure 4), since external influence from state and federal policy mandates certain aspects of agency governance and bounds the scope of the policies and actions available to it. Consequently, we infer that there are few potential leverage points within the policy area that are not directly related to agency culture. Moreover, changes in governance are unlikely to occur prior to upstream changes in other areas such as agency culture and funding, and so we conclude that governance should not be the first area on which organizational change efforts are focused. With those points in mind, the personal and interpersonal aspects of governance, in the form of influence from leadership and from professional organizations, do present themselves as potential avenues for leveraging eventual change.

As in agency culture, strong leadership from the top of the organization can drive changes in norms and systems of governance that lead to expanded accessibility and participation (Decker et al., 2016). Changes in the structure of an agency and its policies, including hiring and incentive systems, will feed back to internal cultural changes (Figure 3). In combination with cultural changes, these systematic changes to governance enable the agency to adopt processes and policies that better serve a broader public.

A second point at which agency leaders can create momentum for change in governance practices is by engaging directly with professional peers and organizations on adaptive solutions to common issues. It has been recognized by AFWA and other organizations that maintaining relevancy, sustainability, and public support are important priorities for the future of state (and federal) wildlife agencies, and substantial amounts of time, energy, and funding have begun to be devoted to these challenges. The present project, and the investment in it by our agency partners, represents one piece of that effort. These conversations and initiatives must continue and motivate change within the collective culture, practices, and priorities of professional organizations and agency leaders, so that successes are not limited to

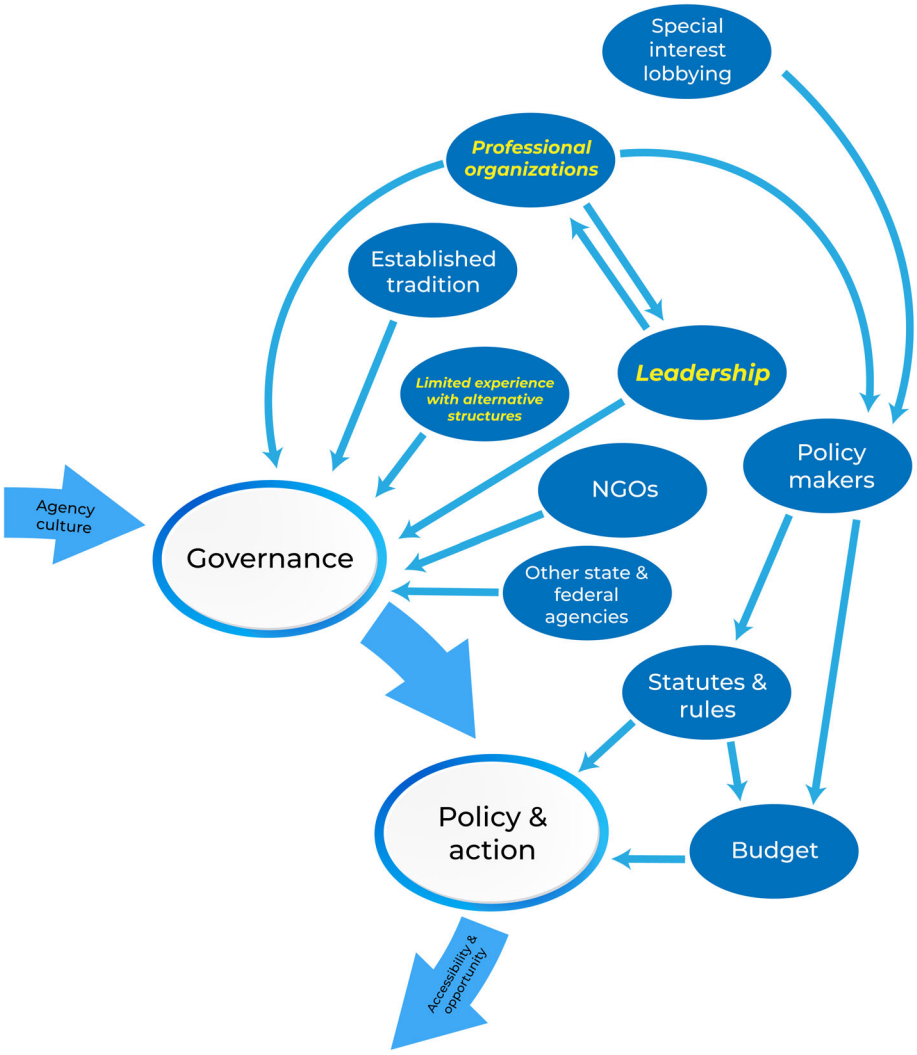

FIGURE 4 Focused subsystem map of agency governance and of policy and action within a "typical" state fish and wildlife agency, in its current state. Blue arrows indicate positive (reinforcing) interactions. For clarity, negative (inhibiting) interactions are not depicted. Components with emphasized orange text indicate potential leverage points for change

individual cases but can rather act to scaffold the process of change across other agencies. One avenue for this support could be the knowledge of and exposure to alternative governance structures and practices that have successfully contributed to change efforts in other agencies (see Pauley et al., 2021). Communication between agency leaders on innovative solutions to change, change management, and the effective use of leverage points—as well as the development of education and training programs that address these needs—will be critical to ensure widespread adoption and success.

5.3 | Expanding accessibility of natural resources and opportunities for engagement

The final link between agencies and the provision of quality-of-life benefits to constituents is the accessibility of natural resources and the opportunities available across the diversity of potential user groups (Figure 5). The current system has been built and reinforced to serve traditional users, and so disproportionately aids accessibility and opportunity for those users. The system is supported by a number of elements that, if manipulated, could act as leverage points for change toward serving a broader user base. In the long run, this will be one of the most important areas of the system in which to effect change, because accessibility and opportunity are where the benefits of management actions actually accrue for the publics that agencies serve. Creating a greater variety of opportunities that attract and are accessible to a broader array of participants will ultimately increase benefits to quality of life and spread those benefits more equitably. An important outcome of this process for agencies will be in the recruitment of new and broader user groups that can contribute to agency funding in different ways depending on the activities that agencies support.

Accessibility and opportunity are shaped by the agency's perception of the public's interest in wildlife and

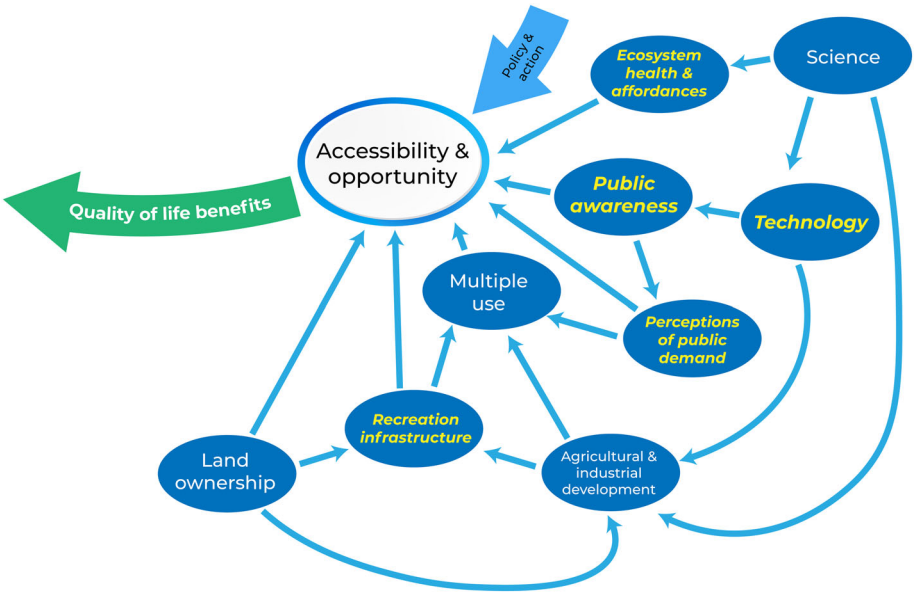

FIGURE 5 Focused subsystem map of accessibility of resources and opportunity within a "typical" state fish and wildlife agency, in its current state. Blue arrows indicate positive (reinforcing) interactions. For clarity, negative (inhibiting) interactions are not depicted. Components with emphasized orange text indicate potential leverage points for change

outdoor-related opportunities, as well as the belief that new publics must be encouraged to fit the existing mold of use (e.g., hunting and angling). In essence, the problem of providing accessibility is one of supply and demand. To increase accessibility, there is a need to adopt established processes from marketing and recreation planning that focus on understanding consumer preferences and demand for different services and providing opportunities that fill the areas of demand in ways that work for those user groups. To properly understand the needs of constituencies, agencies will need to strengthen existing communication channels and open them to a broader audience, as well as embrace new ways of connecting with the public through technology and by tapping the system of connections developed through a more diverse and inclusive agency culture. Knowledge of different user groups can inform the development of infrastructure—both in terms of physical structures and trails but also programs and the capacities of staff—that support the accessibility of a broader user base and provide for a diversity of uses by traditional and nontraditional groups. There is a critical role for the use of social science and human dimensions approaches, and the expansion of internal capacity for social science, to understand and address these problems. A better understanding of the growing segment of constituents that hold mutualist approaches to wildlife and the outdoors can also redefine the agency's notion of ecosystem health and services. For example, broadening the focus of conservation and management efforts beyond game species that have economic value to hunters and anglers can then include a broader array of wildlife and their own contributions to healthy economies, healthy ecologies, and healthy people.

6 | CONCLUDING REMARKS

The vision of the present and potential future state wildlife agency described here was motivated by agency needs and created collaboratively with agencies. The process that we undertook revealed that there is a clear need for organizational change within state wildlife agencies and that there are levers that can be engaged to move change forward. Adaptive change will be neither quick nor easy, but utilizing a systems thinking approach points to several paths toward accomplishing that end. In consideration of the implications of this work for the future course of state fish and wildlife agencies in the United States, we emphasize two important guidelines. First, change must come from within an agency and have solid footing in an understanding of agency culture through rigorous social science; it cannot be externally imposed or presented as an idealized theoretical panacea. The challenge for agency leaders will be to use their positions of power to create an atmosphere of openness to new ideas, to motivate internal support, passion, and buy-in for the shared purpose of transformational change, and to manage the fear and resistance to change that these efforts will naturally generate. Second, as noted by Dooley (1997), the path to change is different for every organization. Our model of a "typical" state wildlife agency is intentionally general; it embodies the current state of an agency within the prevailing institution of natural resource management, but represents no one agency perfectly. Combined agencies that manage fish and wildlife as well as state parks and recreation have different responsibilities, structures, and limitations than ones that manage only fish and wildlife. Each agency will have a different relationship with its

respective state wildlife commission, legislators, and governor, and these officials—as well as agency directors themselves—change with varying frequencies over time, as does public opinion and trust. The importance of our framework is that it represents an actionable, consensus view across a variety of state wildlife agencies and is necessarily an incomplete and imperfect representation. Each agency can emphasize different elements of this framework to suit the unique pathways for change that are available to them, and we encourage agencies and other conservation organizations to adapt it for their own use.

Educational institutions and training programs will play a critical role in the research and implementation of systems change initiatives in state wildlife agencies. We see the present work as a stepping stone from the recommendations of previous initiatives toward the on-the-ground implementation of adaptive change, by using an integrative systems perspective of agencies to identify leverage points and feedback loops within the system that structures an agency's day-to-day operations. The next step in the process is for the university programs that equip candidates for careers in fish and wildlife to re-evaluate their curricula in the light of the skills needed for tomorrow's wildlife professionals—for instance, by providing courses or certificates in a broader variety of skills including leadership and business management, marketing and communication, the social sciences, and multicultural perspectives on natural resources (see Teel et al., 2021). Natural resource programs and funding agencies can emphasize the urgent need for research in the areas of organizational change and systems change as they apply to wildlife agencies and support this research materially. Regular, open communication between agencies and university programs will be necessary to ensure that agency needs are addressed by academic requirements and, conversely, that hiring classifications include the skills being taught. For existing agency employees that require training in additional skills, or in understanding the needs and methods for organizational change and systems theory, programs can be developed to address those needs by using this framework as a broad basis for understanding that can be calibrated on a case-by-case basis to state-specific issues.

Our approach to this study was qualitative and inductive by nature, guided by the voices, perspectives, and lived experiences of the participants that engaged in this process. Our results, and the systems framework we present, therefore represent an integrative, collective view of a state wildlife agency and its potential for change—though necessarily one limited to the views of the agency leaders, academics, and other professionals that engaged in this process. We encourage others to take the opportunity to engage diverse and marginalized voices in identifying other important elements of the system and the leverage points that may be engaged to shape a more inclusive and sustainable future for state wildlife agencies.

With our rapidly changing society, change is a near certainty for the institution of fish and wildlife management. We are confident that state fish and wildlife agencies, guided by supportive leadership and united by a shared vision for conservation across a diversity of values, can tackle the challenges presented by ongoing sociocultural change and serve as strong institutional stewards of our lands and wildlife. It is our hope that the ideas presented here will help to provide the impetus and direction for systems change within agencies and assist in developing the tools and strategies by which it can be achieved.

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CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

AUTHOR CONTRIBUTIONS

Richard E.W. Berl, Michael J. Manfredo, Mark Gasta, Dean Smith, Leeann Sullivan, and Cynthia A. Jacobson conceived of and designed the research. Richard E.W. Berl, Michael J. Manfredo, Mark Gasta, and Leeann Sullivan acquired the data. Richard E.W. Berl and Michael J. Manfredo analyzed and interpreted the data, with assistance from all authors. Richard E.W. Berl and Michael J. Manfredo drafted the manuscript. All authors contributed to critically revising the manuscript, gave final approval of the version to be published, and agree to be accountable for all aspects of the work.

DATA AVAILABILITY STATEMENT

Raw data from the workshops conducted for this project consisted of qualitative discussions and collaborative mapping with participants. The data are shared in this article and its supporting information in synthesized form.

ETHICS STATEMENT

Institutional ethics review was not required for this project. Participation was voluntary, all participants were invited as coauthors on this publication, and all contributions are fully acknowledged.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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