



## PERSPECTIVE OPEN ACCESS

# What Is(n't) Environmental Stewardship? Eliciting Unspoken Assumptions Using Fisheries as a Model

Abigail S. Golden<sup>1</sup>  | William N. S. Arlidge<sup>2</sup>  | Chelsey Crandall<sup>3</sup> | Elias Ehrlich<sup>2,4</sup> | Lotte van den Heuvel<sup>5</sup> | Thomas Klefoth<sup>6</sup> | Sophia Kochalski<sup>7</sup> | Kai Lorenzen<sup>8</sup> | Valerio Sbragaglia<sup>9</sup> | Christian Skov<sup>10</sup> | Paul Venturelli<sup>11</sup> | Robert Arlinghaus<sup>2,12</sup> | Samuel Shephard<sup>13</sup>

<sup>1</sup>School of Aquatic and Fishery Sciences, University of Washington, Seattle, Washington, USA | <sup>2</sup>Department of Fish Biology, Fisheries and Aquaculture, Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Berlin, Germany | <sup>3</sup>Florida Fish and Wildlife Conservation Commission, Tallahassee, Florida, USA | <sup>4</sup>Institute of Biochemistry and Biology, University of Potsdam, Potsdam, Germany | <sup>5</sup>Natural Resources and Sustainable Development, Department of Earth Sciences, Uppsala University, Visby, Sweden | <sup>6</sup>Ecology and Conservation, Faculty of Nature and Engineering, Hochschule Bremen, Bremen, Germany | <sup>7</sup>Center for Ocean and Society, Christian-Albrechts-Universität zu Kiel/Kiel University, Kiel, Germany | <sup>8</sup>School of Forest, Fisheries, and Geomatic Sciences, University of Florida, Gainesville, Florida, USA | <sup>9</sup>Department of Marine Renewable Resources, Institute of Marine Sciences, Barcelona, Spain | <sup>10</sup>Section of Freshwater Fisheries and Ecology, Technical University of Denmark, Silkeborg, Denmark | <sup>11</sup>Department of Biology, Ball State University, Muncie, Indiana, USA | <sup>12</sup>Division of Integrative Fisheries Management, Faculty of Life Sciences, Humboldt-Universität zu Berlin, Berlin, Germany | <sup>13</sup>Biology Department, Ave Maria University, Ave Maria, Florida, USA

**Correspondence:** Abigail S. Golden ([abigolden@gmail.com](mailto:abigolden@gmail.com))

**Received:** 9 July 2024 | **Revised:** 3 January 2025 | **Accepted:** 7 January 2025

**Funding:** This work was supported by the Alfred-Töpfer-Foundation.

**Keywords:** aquatic management | boundary object | conservation | environmental stewardship | Policy Delphi method | pro-environmental behavior | recreational fisheries | stakeholder engagement

## ABSTRACT

Environmental stewardship is often invoked as a net social good and an approach for achieving equitable and sustainable conservation outcomes, but it is rarely defined explicitly in management settings, and conflicting definitions have proliferated. This lack of consensus can influence conservation outcomes in several ways. Conflict can arise between stakeholders with different definitions of stewardship; managers may not proactively identify important stakeholders whose stewardship orientation does not include public advocacy; and stakeholders whose sense of stewardship does not include in-depth knowledge of a particular ecosystem may advocate for ineffective or counterproductive actions. Developing strategies for identifying the implicit, unspoken definitions of environmental stewardship held by resource users, managers, and scientists can help with navigating these challenges. Here, we develop a method to elicit the unstated stewardship orientations of a group of stakeholders in a shared conservation setting. Using thought experiments and a Policy Delphi process, we find that even within our relatively homogeneous test group of recreational fisheries managers and scientists, individuals differed in their understanding of stewardship. We encourage conservation organizations with a mission of stewardship, or ones that interface with environmental stewards, to adopt an approach like this one to identify potential sources of conflict, inequity, and ineffective action before they arise.

This is an open access article under the terms of the [Creative Commons Attribution](https://creativecommons.org/licenses/by/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2025 The Author(s). *Conservation Letters* published by Wiley Periodicals LLC.

## 1 | Introduction

Environmental stewardship has emerged as a conceptual framework for understanding the place of humans in nature and for acting to ensure a healthy future for people and the planet (Chapin III et al. 2010; Bennett et al. 2018; Peçanha Enqvist et al. 2018; Shephard, List, and Arlinghaus 2023). Many conservation and natural resource management organizations draw on environmental stewardship in their missions and programming: certifying bodies like the Forest Stewardship Council and the Marine Stewardship Council fold the concept into their organizational identity, while organizations as diverse as Conservation International, the US National Parks Service, and the US Department of Agriculture operate stewardship programs. The environmental stewardship framework has great potential for describing and fostering care of the environment and pro-environmental actions by individuals and groups (e.g., Shephard, List, and Arlinghaus 2023; Shephard et al. 2024). However, the term “environmental stewardship” (herein “stewardship”) has been defined in a wide variety of ways across the literature, which differ or conflict in the elements they emphasize. For instance, Shephard, List, and Arlinghaus (2023) base stewardship in personal character (virtue), emphasizing the pro-environmental behavior and underlying beliefs and values of individual nature users. In contrast, Bennett et al. (2018) describe stewardship broadly as actions taken by individuals or groups to “protect, care for or responsibly use the environment,” regardless of people’s motivations and ability to act effectively. These often-unstated differences in individuals’ and organizations’ understanding of human responsibilities vis-a-vis nature underpin broad-ranging debates about the future of environmental management and conservation, such as the “new conservation” debate (Doak et al. 2014).

Due to its broad appeal and emphasis on widely shared values such as care, the stewardship concept can potentially bring together diverse interests and perspectives across certain cultural, philosophical, and practical boundaries that exist in sustainability science (Chapin III et al. 2010; West et al. 2018). However, ambiguity arises when stakeholders, management practitioners, or academics hold divergent, and perhaps contradictory, ideas of what “stewardship” means. Key social-ecological concepts in sustainability science tend to have a normative emphasis, with potential to create shared spaces for sustainability transformations. The same potential holds for stewardship. Given the pluralistic nature of sustainability where multiple objectives coexist, it is important to understand differences and intersections of perspectives, rather than resort to universalist solutions (Plummer et al. 2020; West et al. 2024). Peçanha Enqvist et al. (2018) took a step forward in exploring the multiple meanings inherent in stewardship by categorizing existing definitions in terms of their emphasis on whether groups or individuals have an ethic or motive of *care* for their environment, have ecological *knowledge*, and possess *agency* to protect, restore, or sustainably use natural ecosystems. Stewardship is typically animated by notions of care, although this carries normative assumptions about what it means to care and what is good for the target of care (West et al. 2018). Shephard, List, and Arlinghaus (2023) built on this concept and the work of Chapin III et al. (2010), introducing a care-knowledge-agency stewardship model specifically for recreational fisheries.

Recreational fishing is a suitable model system in which to explore the variety of stewardship definitions because of the key role played by recreational fishing stakeholders who actively assume stewardship identities and engage in stewardship actions through practices such as catch-and-release, stocking, or habitat enhancement (Shephard, List, and Arlinghaus 2023). Throughout the world where fishing rights are public, recreational fisheries managers at the local and regional level typically make decisions about how to manage resources in direct response to the stated needs and desires of recreational fisher stakeholders, who often frame those desires in the form of stewardship of their target resource. In Central and Western Europe, anglers have direct control of aquatic ecosystems through self-organized private angling clubs that own and manage lakes and rivers under private fishing rights (Arlinghaus et al. 2022). In both of these models, the stewardship orientation and priorities of anglers directly influence the management actions that are taken. Many recreational fisheries represent good examples of participatory co-management of natural resources, but ineffective or counter-productive management actions can be adopted and perpetuated when recreational fishers advocate for specific environmentally damaging actions despite mixed or negative evidence of their effectiveness. One prominent example is the widespread stocking of hatchery-reared fish to supplement natural populations of target species (Radinger et al. 2023). The disposition of recreational fishers and managers toward stocking can be linked to social and personal norms in favor of stocking as an easy fix for fish stock declines (Riepe et al. 2017; Arlinghaus et al. 2022). This perception contradicts increasing scientific evidence that this practice does not necessarily increase fish population abundance or catch rates in the long term, while carrying substantial ecological risks (Hühn et al. 2014; Arlinghaus et al. 2022; Radinger et al. 2023). Another example is the support of many recreational fishers for culling of fish-eating birds, which brings recreational fishers into conflict with birders, another stewardship-oriented bloc of outdoor recreationists (Dorr et al. 2012; Cooke 2021).

Understanding how recreational fishers define “stewardship” can help managers (whether in local government or angling group leadership) ask and answer questions like: What are the root causes of conflicts between stakeholders in my area, and how can we find common ground? What motivates stakeholders’ advocacy for management actions that are not feasible and/or effective, and what alternative actions might satisfy those desires? What stakeholder groups might we be excluding because they do not self-identify as stewards of this resource, or because their stewardship orientation does not center on public advocacy? These questions are significant, because sustainable and equitable futures depend on fundamental shifts in stewardship incentives and norms (Chapin III et al. 2022).

This paper originated when the authors, a multidisciplinary group of fisheries scientists and managers, convened a workshop session to discuss stewardship in recreational fisheries. During this discussion, we realized that even within this small, relatively homogeneous group of professionals, some of us disagreed strongly about what it means to be a steward of a natural resource or ecosystem. These differences appeared to emerge from differing worldviews and associated nature-related values, which can vary substantially among conservation professionals (Luque-Lora et al. 2022). The group decided to explore where our

ideas around stewardship coincided and where they diverged. To better understand each other's standpoints and explore sources of conflict, we posed a series of hypothetical thought experiments that challenged implicit assumptions about stewardship. While these thought experiments did not always enable workshop participants to reconcile their competing ideas, we found them to be a useful tool for understanding each other's views.

Here, we describe our process of eliciting different understandings of stewardship, in the hope that our experiences might help other practitioners and stakeholders working with the stewardship concept to clarify their implicit definitions. We first present a series of questions that emerged from and guided our discussion (Section 3). Each question complicates or challenges implicit understandings of stewardship. Second, we present the results of an online survey that re-exposed the original workshop participants to these thought experiments 6 months after the initial discussion (Section 4). We discuss our findings in relation to the care-knowledge-agency model most recently synthesized by Peçanha Enqvist et al. (2018) and Shephard, List, and Arlinghaus (2023). Adopting the approach presented in this paper can help build a shared practical understanding of stewardship and avoid conflicts that are rooted in implicit differences in values.

## 2 | Methods

We adopted a Policy Delphi method (De Loë et al. 2016), distinguished from the classic Delphi method (Turoff and Linstone 1975) in that it aims to explore different viewpoints rather than reach expert consensus. The method consisted of two elicitation rounds. Round 1 occurred during a workshop session on stewardship in recreational fisheries conservation and management that was held in Siggen, Germany, October 16–19, 2023. Over 2 days, the concept of environmental stewardship was discussed in a small-group setting where 13 workshop participants (the coauthors on this article) posed hypothetical thought experiments in order to help articulate implicit definitions of stewardship and where these definitions fall within the care-knowledge-agency framework (Peçanha Enqvist et al. 2018; Shephard, List, and Arlinghaus 2023). Participants were all PhD-level academic researchers with expertise in fisheries science ( $n = 8$ ), social science and human dimensions of natural resource management ( $n = 2$ ), or an interdisciplinary mix of fisheries science and human dimensions ( $n = 3$ ). The participant group's regional expertise centered primarily in North America and Western Europe, with especially high representation from the United States and Germany. Seven particularly fruitful thought experiments that provoked disagreement among workshop participants were selected for further examination. Following the workshop, participants drafted descriptions of these seven thought experiments, with supporting examples and citations (Section 3).

Round 2 took place 6 months after the initial workshop. We used an online survey administered through Qualtrics to elicit participants' personal definitions of stewardship and identify areas of agreement and disagreement based on the thought experiments selected from Round 1. Two workshop participants with social science expertise developed the survey instrument, consisting of (a) a presentation of each thought experiment, (b) a multiple-choice question eliciting the respondent's personal response to

that thought experiment, and (c) an open-text response area for survey takers to expand on their answers (Appendix). The remaining 11 workshop participants completed the survey, and their responses were then described and analyzed thematically by the survey developers to identify areas of agreement and disagreement. Participants' responses were anonymized for the other participants but not the analysts. This research process was designated Exempt by the University of Washington Institutional Review Board.

## 3 | Defining Stewardship

In each subsection below, we outline a thought experiment that explores values or assumptions related to stewardship. We focus on presenting the arguments for both sides of the debate rather than definitively answering each question or making a value judgment about the validity of different responses. The arguments refer to specific hypothetical and empirical case studies generated in our workshop discussion and, where appropriate, reference the care-knowledge-agency framework developed by Peçanha Enqvist et al. (2018). These case studies reflect our expertise in recreational fisheries conservation and management, but we believe that the themes that we explore are applicable to other conservation contexts.

### 3.1 | Can Someone be an Environmental Steward by Refraining From Interacting With a Target Natural Resource or Ecosystem?

Shephard, List, and Arlinghaus (2023) explore how a person's care, knowledge, and agency come together to inspire a definite stewardship action. But what if a person applies their *care* and *knowledge* to a problem and identifies that the most effective way to use their *agency* in a situation is to avoid interacting with a target resource or ecosystem entirely? An example might be a person with a deep environmental ethic (care) and a university degree in environmental science (knowledge) who decides that the best way to care for a vulnerable ecosystem is to live in a dense urban setting; refrain from fishing, hunting, and wildlife viewing; and rarely travel to wilderness areas. Someone whose definition of stewardship emphasizes care and knowledge of a particular place (Dresner et al. 2015; Gottwald and Stedman 2020) might feel strongly that, because the person is not interacting with the place(s) or species their actions are intended to protect, these behaviors do not qualify as stewardship. In contrast, someone whose definition of stewardship is mainly concerned with motivations, knowledge, and/or outcomes (Loreau 2014) might consider this person an active steward of the environment through their conscious, moral choice to refrain from direct interaction with nature.

### 3.2 | Can Someone be a Steward Without Being Motivated by Care for the Environment?

Do an individual's motivations for pro-environmental activity make a difference, or is the final stewardship action itself all that designates someone a steward? A person may be motivated by self-interest to take an action that is generally considered

**TABLE 1** | Table outlining each of the four thought experiments outlined in Section 3 for which there was disagreement among participants, the multiple-choice response options to that thought experiment (number of responses in the survey in parentheses), and an example open-text clarification of that response from the survey. Concepts from the Peçanha Enqvist et al. (2018) framework are emphasized in **bold** and color-coded when they appear across contexts (e.g., when the concept of care appears in responses other than Question 3.2). Care is in orange, knowledge is in blue, action is in green, and outcome is in purple.

Case study	Multiple-choice response	Example open-text response
3.1 Can someone be an environmental steward by refraining from interacting with a target natural resource or ecosystem?	Yes ( $n = 8$ )	“Someone can be a steward by refraining from directly interacting with a target resource or ecosystem, but only when they <b>continue to care about the system, keep their knowledge about the system updated</b> and <b>start to take actions</b> to protect the system when it is getting endangered.”
	No ( $n = 3$ )	“I think that stewardship is about forming a relationship with the environment, <b>understanding its needs, and working to maintain or enhance its health</b> . This relational aspect could be seen as lacking when the approach is purely non-interactive.”
3.2 Can someone be a steward without being motivated by care for the environment?	Yes ( $n = 4$ )	“A pro-environmental behavior that is not motivated by care for the environment but by pure self-interest is highly unstable. As soon as another behavior with negative outcomes for the environment provides a higher benefit for the individual, the pro-environmental behavior is given up.”
	No ( $n = 7$ )	“Yes, because <b>the outcome is what counts</b> , and people are much more willing to engage in stewardship if they benefit personally. From my perspective, an individual’s motivation and ethics for participating in stewardship actions is less important than actions and outcome.”
3.3 Can someone be a steward without having the agency to act or affect outcomes?	Yes ( $n = 8$ )	“Stewardship can be seen as a moral stance or a set of values rather than just a set of actions. Members of disempowered communities can still consider themselves stewards if they <b>maintain their knowledge, care for the environment</b> , and a desire to protect it, even if their ability to act is constrained.”
	No ( $n = 2$ )	“Agency is a high bar, because to be fully realized, it requires <b>knowledge and skills</b> (so you know what to do and how), as well as internal empowerment (virtuous locals who act for the common good) and external empowerment (a supportive legislative framework). Lacking any of these components can impair or prevent good stewardship.”
3.4 Does stewardship consist of taking action or of generating outcomes?	Anyone who takes an environmentally conscious action is acting as a steward, regardless of the outcome of that action ( $n = 8$ )	“Stewardship actions may fail, especially when new approaches are tested. If stewardship were only validated by positive environmental outcomes, innovative approaches to environmental management would be used less often.”
	Only someone whose actions have positive environmental outcomes can be considered to be an environmental steward ( $n = 2$ )	“Although I would consider environmental stewardship ultimately as the combination of <b>care</b> and action of positive outcome for the natural environment, I want to highlight that <b>people caring about their natural environment and just taking the ‘wrong’ actions due to a lack of knowledge have a high potential to become environmental stewards</b> . This potential can be addressed in the management of ecosystems by working together with those people, informing them and empower them to take the ‘right’ actions that really help the environment.”

**TABLE 2** | Table outlining each thought experiment outlined in Section 3, potential responses to each thought experiment, potential positive and negative outcomes of each likely response, and an example of a conservation scenario where this thought experiment might arise.

<b>Case study</b>	<b>Likely responses</b>	<b>Potential positive outcomes</b>	<b>Potential negative outcomes</b>	<b>Example of a situation where this question might arise</b>
3.1 Can someone be an environmental steward by refraining from interacting with a target natural resource or ecosystem?	Yes, noninteraction is a valid form of stewardship.  No, stewardship requires active interaction with an ecosystem.	Lower carbon emissions, lower human impact on sensitive ecosystems (erosion, etc.)  Building of first-hand ecological knowledge that identifies early indicators of ecosystem change; continual reinforcement of care for the ecosystem	Lack of first-hand knowledge of ecosystem dynamics leading to shifting baseline syndrome; erosion of care over time through noninteraction  Greater human impacts on sensitive ecosystems, including carbon emissions, erosion, pollution, and harvest	To reduce fishing mortality for an overfished species subject to an open-access recreational fishery, managers are considering whether to launch a public awareness campaign to try to persuade anglers to reduce their fishing days or practice catch and release
3.2 Can someone be a steward without being motivated by care for the environment?	Yes, the motivations for stewardship action do not matter.  No, a person/group must care for the environment in order to be a steward.	Building a broader coalition of people/groups taking stewardship actions  Higher individual/group commitment and increased likelihood of shared values among stewards	Stewardship activities and actions may be less stable in the long run if other priorities arise (e.g., profit from natural resource extraction)  Risk of excluding or gatekeeping some individuals/groups interested in taking pro-environmental action	An agency is considering implementing an alternative livelihood conservation program where commercial or subsistence fishermen are offered the opportunity to convert their vessels to SCUBA diving tourism.
3.3 Can someone be a steward without having the agency to act or affect outcomes?	Yes, people/groups with care for and knowledge of the environment can be stewards even if they lack agency to act effectively.  No, people/groups must be able to affect outcomes in order to be considered stewards.	Advancing social equity and environmental justice by including stewards from historically disenfranchised groups  Ability to focus stewardship activities and organizing resources where they are most likely to be effective	Risk of ineffective stewardship actions and disillusionment with stewardship activities if agency remains limited/nonexistent  Risk of further disenfranchising historical stewards whose agency has been systematically eroded (e.g., Indigenous stewards); risk of excluding stakeholders who could gain agency in the future and/or could pursue unconventional pathways to achieving agency (e.g., direct action and media engagement)	A conservation organization is deciding whether to start a stewardship program for communities adjacent to a national park, even though the park is inaccessible without permits and mountaineering gear.

(Continues)

TABLE 2 | (Continued)

Case study	Likely responses	Potential positive outcomes	Potential negative outcomes	Example of a situation where this question might arise
3.4 Does stewardship consist of taking action or of generating outcomes?	<p>Stewardship consists of any pro-environmental action, regardless of outcome.</p> <p>An action must have positive environmental outcomes in order to be considered stewardship.</p>	<p>Creation of space for innovation and experimentation to develop new conservation strategies (e.g., adaptive management in fisheries), even when outcomes are uncertain</p> <p>Can focus resources and energy on stewardship activities with proven pro-environmental benefit</p>	<p>Risk of wasting resources and time on ineffective or even counterproductive stewardship actions</p> <p>Risk of blocking pathways for exploring and developing potentially valuable stewardship actions without an evidence base supporting their effectiveness; risking excluding or alienating stakeholders whose stewardship actions are ineffective but have nontangible benefits (e.g., increased pro-environmental values and ecological knowledge)</p>	<p>Managers are developing metrics of success for a new environmental stewardship program.</p>
3.5 Is feeling like a steward necessary and/or sufficient for stewardship?	<p>People who identify as environmental stewards are stewards, regardless of their stewardship activities.</p> <p>A person or group's identity as a steward depends only on their care and/or actions taken for the environment and not on whether or not they identify as a steward.</p> <p>Only people/groups who both identify as stewards and exhibit care for the environment and/or effective pro-environmental actions are stewards.</p>	<p>Creating the broadest possible umbrella of stewardship identity can help foster pro-environmental behavior and care.</p> <p>Avoiding pitfalls of basing stewardship on self-selection and self-reported conservation orientation (e.g., moral licensing)</p> <p>Ability to focus resources and energy on groups and individuals whose actions backed by strong and sustained sense of self and are therefore more likely to be sustained in the long term</p>	<p>Risk of ineffective or harmful stewardship actions; risk of "moral licensing" where people feel licensed to take anti-environmental actions because of their pro-environmental beliefs</p> <p>Risk of excluding or gatekeeping some individuals/groups who consider themselves stewards but are still in the process of gaining the environmental knowledge necessary to take action</p> <p>Risk of excluding or gatekeeping some individuals/groups who take pro-environmental actions but do not self-identify as stewards</p>	<p>Managers are attempting to address conflict between two stakeholder groups with an interest in the same ecosystem, where one group publicly identifies as stewards of the ecosystem, while the other professes similar values but does not frame them through the lens of stewardship.</p>

(Continues)

TABLE 2 | (Continued)

Case study	Likely responses	Potential positive outcomes	Potential negative outcomes	Example of a situation where this question might arise
3.6 Can a person be a steward of an individual organism or taxon, or only an ecosystem as a whole?	<p>Stewardship operates only at the organism/taxon level.</p> <p>Stewardship operates only at the ecosystem level.</p> <p>Stewardship can operate at either the organism/taxon or ecosystem level.</p>	<p>Potential for more focused, and therefore potentially more effective, conservation actions; leveraging the appeal of charismatic megafauna to gain support for pro-environmental action</p> <p>Stewardship actions with an ecosystem-level lens may be less likely to have unintended consequences and could use resources and time more efficiently.</p> <p>Providing the greatest flexibility to take effective action at an appropriate scale for a given problem</p>	<p>Actions taken to conserve or steward a single organism or taxon have a risk of harming other taxa within the ecosystem or endangering broader ecosystem function</p> <p>Stewards may not have agency to act effectively at the whole-ecosystem level; risks alienating stakeholders with a single-taxon focus (e.g., birders, recreational anglers) who see their concerns not being addressed</p> <p>Risk of actions taken to conserve or steward a single organism or taxon harming other taxa within the ecosystem or endangering broader ecosystem function</p>	<p>Managers are attempting to balance the conflicting needs of multiple endangered species and/or endangered species that are in conflict with a species of recreational or cultural value (e.g., Southern Resident Killer Whales and salmon in the Puget Sound).</p>
3.7 Can groups or organizations be stewards, or just individuals?	<p>Stewardship is an individual trait.</p> <p>Stewardship is a group trait.</p> <p>Stewardship can be a trait of groups and/or individuals.</p>	<p>Focusing discussions around fostering stewardship at the individual level, where care for the environment is easiest to influence</p> <p>Emphasizing the synergistic benefits that can occur when groups work together toward a common goal</p> <p>Providing the greatest flexibility to take effective action at an appropriate scale for a given problem</p>	<p>Risk of missing the synergistic benefits that can occur when groups work together toward a common goal</p> <p>Risk of excluding or not considering potential stewardship actions and activities that can be effective when taken by individuals working alone</p> <p>Overly expansive definitions have a risk of including organizations whose stated stewardship missions are not borne out by their actions and care orientation.</p>	<p>A foundation is deciding how it wants to support steward(s) and stewardship organizations in the context of environmental challenges at different scales, such as climate change (global) versus species shifting across boundaries (national and regional) versus point source pollution (local).</p>

stewardship behavior and/or has a positive environmental outcome. For example, commercial fishers on a coral reef may discover that it is more profitable to rent their boat out to SCUBA diving tourists than to continue harvesting fish. By switching to a nonconsumptive use of their local reef, these fishers ease fishing pressure on that ecosystem, which may benefit fish abundance. According to Stern (2000), both impact-oriented approaches (a person is a steward if their actions lead to positive environmental impact) and intent-oriented approaches (a person is a steward if their actions are motivated by pro-environmental intentions) are relevant to the definition of environmentally significant behavior, while others have applied ethical theories to arrive at an either-or type conclusion about what stewardship is or is not. Someone making a deontological argument would not consider a career-switching fisher to be a steward, instead seeing actions in terms of moral rules to be obeyed because they are “the right thing to do” (Griffin et al. 2020). In this framework, a person’s intentions outweigh the consequences of their actions. More holistically, virtue ethics centers on the existence of “virtue” as a stable character disposition to do the right thing in the right way at the right time, shaping specific actions (List 2013). In contrast, utilitarian frameworks are focused on the outcome of producing the greatest good for the greatest number of people, so “right” actions (those that constitute stewardship) are those that achieve this goal, and individuals’ motivations for participating in those actions are largely irrelevant (Loreau 2014).

### 3.3 | Can Someone be a Steward Without Having the Agency to Act or Affect Outcomes?

Even if people *care* about their environment and have the necessary *knowledge* to protect it, they may lack the *agency* to do so. For example, consider a local Indigenous community that cares deeply about its local ecosystem and has managed it successfully for generations but has recently been subject to a changing governance system in which it is disempowered such that its traditional management mechanisms no longer function. Similarly, consider a local angling community with management rights to fisheries on a river where a large hydropower facility has recently had devastating impacts on local fisheries that no fisheries management action can mitigate. Do members of communities like these cease to be “stewards”? Community members retain appropriate knowledge and skills, but their agency is eroded by lack of jurisdictional boundaries, lack of ability to sanction cheating, and loss of other types of power. Peçanha Enqvist et al. (2018) argue that an effective steward needs all of these factors, including the power to turn action into a positive outcome, while Shephard, List, and Arlinghaus (2023) argue that this is not necessarily the case, meaning that “good environment-oriented intentions” are sufficient.

### 3.4 | Does Stewardship Consist of Taking Action or of Generating Outcomes?

Does a person become a steward by taking action or can they be considered stewards only if that action achieves a successful conservation *outcome*? For example, stewardship intentions motivate the widespread fisheries management practice of stocking hatchery-reared fish into natural ecosystems (Arlinghaus et al.

2022), where the aim of the actor (fisheries manager) is to help wild fish. Yet, such actions often unintentionally fail to help fish stocks or may even be environmentally damaging (Lorenzen 2014; Radinger et al. 2023). Other examples of stewardship actions with unintentional negative outcomes include salt pond restoration leading to a catastrophic fish kill (Takekawa et al. 2015) and the introduction of invasive species following well-intentioned attempts to control erosion (Forseth and Innis 2004). In these cases, actors are motivated by *care* to take definite *action* but their actions fail because of a lack of relevant *knowledge*. Hence, one may argue that stewardship depends only on the environmental outcomes of a person’s behavior, regardless of whether or not their actions are motivated by care for the environment (3.2) or whether they even take action at all (3.1, 3.3). In contrast, such behaviors may be seen as helping maintain stewards’ pro-environmental orientation and decision-making power even if the practices themselves are not ecologically effective (Harrison et al. 2018).

### 3.5 | Is Feeling Like a Steward Necessary and/or Sufficient for Stewardship?

Can one be considered an environmental steward without explicitly identifying as one? And does identifying as an environmental steward automatically make a person one? Regarding the first question, there is evidence that individuals and groups can act as effective caretakers of natural systems without explicitly identifying as stewards, by engaging in knowledgeable, environmentally responsible behaviors driven by values and concern for the environment (*care*) that have pro-environmental *outcomes* (Harrison et al. 2018; Carter 2023). Regarding the second question, while self-perception as a steward may not be necessary for positive environmental actions, consciously identifying as a steward can potentially motivate and reinforce positive environmental behaviors and lead to more frequent and continued involvement in stewardship actions (Landon et al. 2018). However, identifying as a steward can backfire if this perception hinders critical self-evaluation and enables moral licensing, which occurs when people who have taken a virtuous action (e.g., purchasing solar panels for their home) feel entitled to engage in less virtuous behavior (e.g., increasing home energy consumption) without a perceived loss of moral standing (Merritt et al. 2010; Dütschke et al. 2018).

### 3.6 | Can a Person Steward an Individual Organism or Taxon, or Only an Ecosystem as a Whole?

Can one steward individual organisms or taxa, or only entire ecosystems? Challenges with stewarding specific taxa become evident when examining groups like anglers and birders who interact with the same ecosystems. Despite each group routinely identifying as stewards (Cooper et al. 2015), they may focus exclusively on their target organism and have conflicting views on ecosystem management. Anglers’ culling of fish-eating birds such as cormorants, in contrast with birders’ efforts to conserve these same species, is one visible area of conflict between these constituencies (Dorr et al. 2012; Cooke 2021). These conflicting actions could necessitate a more holistic definition



of stewardship, one that requires actors to steward all aspects of a coupled social–ecological system. In contrast, one could argue that any activity dependent on a wild species requires the continued flourishing of that species, and that stewardship of that species and activity will have positive spillover effects for the environment as a whole. Further, participating in wildlife-related recreation activities can lead to participants increasing their attachment to place, connection to the ecosystem, and pro-environmental behavior (e.g., Teisl and O’Brien 2003; Cooper et al. 2015; Shephard et al. 2024). In this view, outdoor activities give participants a tangible connection to the environment and a personal motivation to act as stewards.

### 3.7 | Can Groups or Organizations be Stewards, or Just Individuals?

In some cases, effective stewardship may not be achievable by individuals alone given the scale of populations and ecosystems. Therefore, can groups or organizations be stewards in the same way, or an equivalent way, as individuals? Here, we explore two examples of group stewardship. In the North American Model of Wildlife Conservation, fish and wildlife resources are held in public trust and managed by agencies whose operations are guided by stated values associated with *care* (e.g., conserving wildlife for present and future generations), *knowledge* (agencies conduct research programs and are often mandated to use science in decision-making), and *agency* (agencies make legally binding conservation rules and employ enforcement officers; Organ et al. 2012). Here, the organizational structure is instrumental to coordinating or implementing the stewardship of trust resources at scale. As a second example, consider a multinational, environment-oriented nongovernmental organization that adopts values of care held by urbanites in the global north, rejects local ecological knowledge as a basis for decision-making, and engages in publicity-generating but ineffective actions. Though this may be an extreme example, it illustrates some of the ways in which international agencies can fall short of stewardship goals. Overall, one could argue that both individuals and groups/organizations can be stewards, not the least because organizations ultimately represent the collective wisdom of all individuals within them.

## 4 | Synthesizing Policy Delphi Responses

In the online survey, workshop participants agreed about three of the thought experiments and disagreed about the four others (Figure 1). In general, the responses that elicited agreement revealed a generous interpretation of *who* would be a steward of *what*: participants agreed that stewardship could be a trait of groups, organizations, or individuals (3.7), and that people or groups could steward both organisms and ecosystems (3.6). They also agreed that self-identification as a steward was neither necessary nor sufficient for environmental stewardship (3.5). There was no clear pattern in responses to the four questions for which there was disagreement—that is, responding “yes” to one question did not correspond with a “yes” response to other questions (Figure 2). However, the open-text responses to these four questions revealed that *care*, *action/outcome*, and especially *knowledge* about the environment were intertwined in coau-

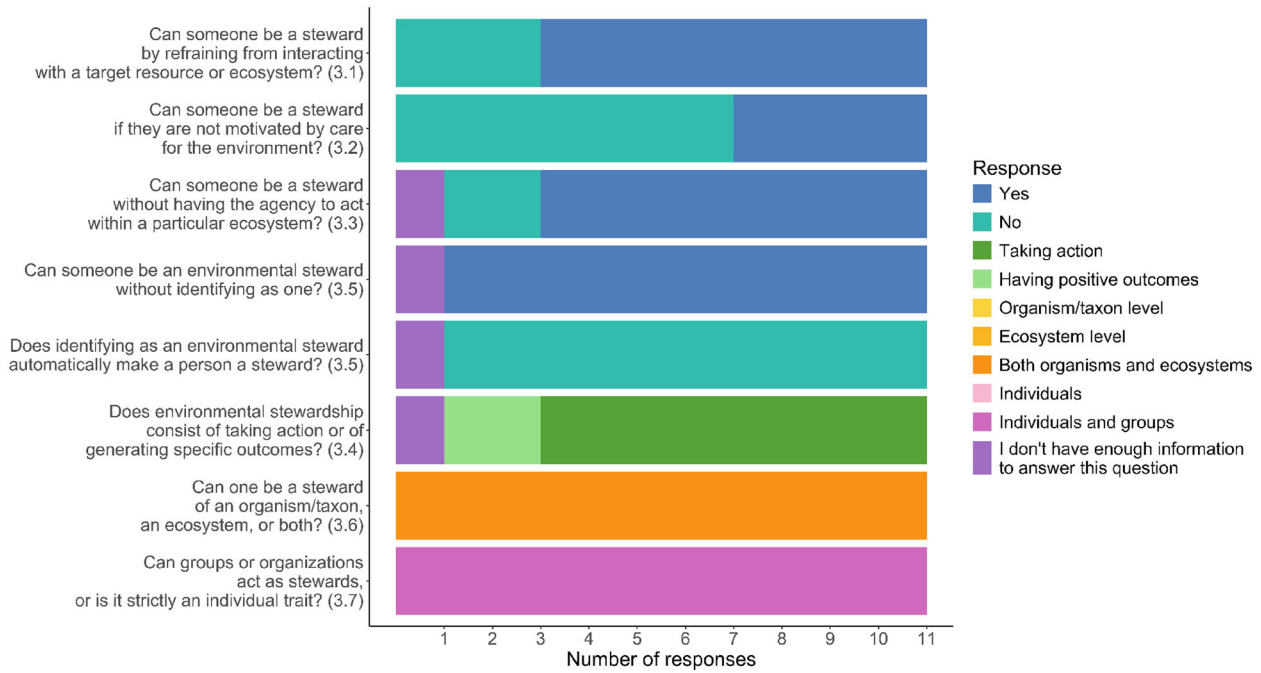
thors’ definitions of stewardship, with knowledge in particular appearing across responses to all four questions (Table 1).

## 5 | Conclusions

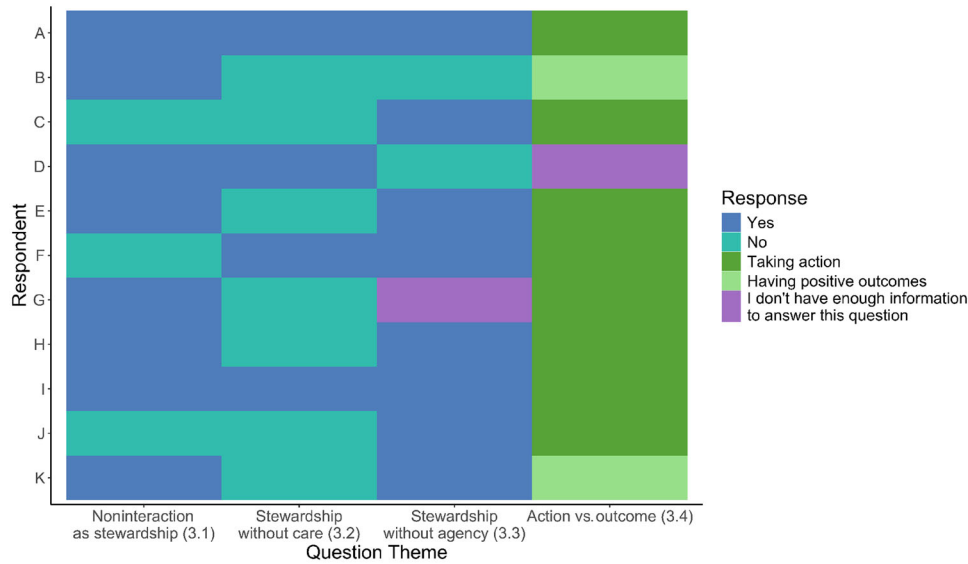
Our findings can be used as an example of how much difference of opinion there can be about this complex boundary concept even within a small and homogeneous group of experts with a shared scientific background. We do not claim that specific patterns of agreement and disagreement within this small sample of professional scientists and managers are representative of all scientists or other stakeholders, especially given the relatively narrow subject matter and regional expertise represented in our group. However, the lack of clear patterns of agreement/disagreement in individuals’ responses to different case studies (Figure 2) suggests that it may be difficult to assess someone’s personal stewardship orientation without an in-depth elicitation process like the one here. Therefore, we suggest that organizations with a mission of stewardship, along with groups coming together formally or informally to steward an ecosystem, use the questions outlined here to elicit the stewardship orientations held by group members and make them explicit.

We see two benefits of this exercise. First, identifying whether a group holds shared stewardship orientations or includes individuals with views that diverge in specific ways can help leaders anticipate and head off conflict before it emerges. Second, there are specific benefits and pitfalls of the different stewardship frameworks explored above, and it will be useful to create a shared space where each is incorporated (West et al. 2024). If a group knows which definition(s) underlie its stewardship activities, it can more easily anticipate and navigate trade-offs. To illustrate these trade-offs, Table 2 outlines the potential responses to each of the thought experiments in Section 3, along with potential positive and negative outcomes of these responses, and an example of a conservation scenario where these thought experiments might arise. As one example, groups who define stewardship in terms of *care* risk focusing their efforts on ineffective or even harmful actions if their acts of care are not rooted in *knowledge* and appropriate goals that are likely to enhance the well-being of people and nature (Chapin III et al. 2022). In contrast, groups who define stewardship in terms of achieving positive *outcomes* are likely to fall short of these goals if they do not consider whether their members have the *agency* to act effectively in a given context and if they fail to allow space for innovating because the benefits of new conservation strategies are unknown.

Our list of thought experiments is not intended to be exhaustive, and we welcome the development of new thought experiments or modifications of the ones presented here to better address other groups’ priorities. Our shared focus on recreational fisheries means that the case studies we chose, and our areas of agreement and disagreement, reflect current areas of conflict and consensus in this subfield. For instance, the universal agreement within our group that stewardship can operate at both species and ecosystem levels (Figure 1) could be seen as a function of the fact that anglers and recreational fishery managers tend to focus on taxon-level population dynamics and ecology, implementing management measures like stocking and habitat enhancement to improve abundance of target species. A conservation group



**FIGURE 1** | Stacked bar plot summarizing coauthors' responses ( $n = 11$ ) to survey questions eliciting their personal opinions on the seven thought experiments explored here (section numbers indicated in parentheses). Colors in the legend that do not appear in the plot refer to multiple-choice response options that were not selected by any survey takers.



**FIGURE 2** | Heatmap of individual coauthors' survey responses (alphabetized with letters A–K; y-axis) to the four Policy Delphi survey questions that had disagreement (x-axis). Colors are the same as in Figure 1. Numbers in parentheses on the x-axis question labels refer to sections in the text.

focused instead on wilderness preservation, where charismatic species are treated as flagships for broader ecosystem conservation, might answer this question differently. Another important case that is not addressed within this stewardship framework is the traditional ecological knowledge and management practices held by many Indigenous communities. Many Indigenous worldviews integrate person, place, knowledge, and care in cultural norms and a cosmivision that are best explored through an entirely different model of knowledge generation (Reid et al. 2021).

In addition, several of our thought experiments present binary simplifications of traits that more realistically exist on a spectrum. One coauthor highlighted this in their survey response in the context of the action/outcome dichotomy, writing, “people caring about their natural environment and just taking the ‘wrong’ actions due to a lack of knowledge have a high potential to become environmental stewards. This potential can be addressed in the management of ecosystems by working together with those people... [to] empower them to take the ‘right’ actions that really help the environment” (Table 1). Transdisciplinary research and par-

participatory approaches in management can help overcome the lack of knowledge that prevents positive outcomes of people's actions for the environment as they allow for knowledge transfer between science and practice. Furthermore, participatory approaches can be very useful to (1) identify common goals and mitigate conflicts, (2) value the motivation of people to take pro-environmental action and strengthen their care, and (3) improve skills and find well-accepted actions that generate positive outcomes. The exchange of ideas about different definitions of stewardship is key to all of these steps in participatory management processes and becomes increasingly important as stakeholder-involving approaches are more frequently used in ecosystem management.

## Acknowledgments

The workshop took place within the international IFishMan-workshop on recreational fisheries, which was held October 17–19, 2023, in Siggen, Germany. The workshop was made possible through funds and in-kind support by the Alfred-Töpfer-Foundation, which is gratefully acknowledged. V.S. is supported by a “Ramón y Cajal” research fellowships (RYC2021-033065-I) granted by the Spanish Ministry of Science and Innovation, and he also acknowledges the “Severo Ochoa Centre of Excellence” accreditation (CEX2019-000928-S). K.L. acknowledges support from the Mote Eminent Scholar Program at Florida State University and Mote Marine Laboratory.

## Conflicts of Interest

The authors declare no conflicts of interest.

## Data Availability Statement

The anonymized Policy Delphi survey data and the script for Figure 1 are available publicly at <https://github.com/abigailgolden/environmental-stewardship>.

## References

- Arlinghaus, R., C. Riepe, S. Theis, T. Pagel, and M. Fujitani. 2022. “Dysfunctional Information Feedbacks Cause the Emergence of Management Panaceas in Social-Ecological Systems: The Case of Fish Stocking in Inland Recreational Fisheries.” *Journal of Outdoor Recreation and Tourism* 38: 100475.
- Bennett, N. J., T. S. Whitty, E. Finkbeiner, et al. 2018. “Environmental Stewardship: A Conceptual Review and Analytical Framework.” *Environmental Management* 61: 597–614.
- Carter, D. P. 2023. “Sustaining Civic Recreation: Understanding What Shapes Climbers’ Contributions to Local Resource Stewardship and Advocacy.” *Journal of Outdoor Recreation, Education & Leadership* 15, no. 1, 77–93.
- Chapin III, F. S., S. R. Carpenter, G. P. Kofinas, et al. 2010. “Ecosystem Stewardship: Sustainability Strategies for a Rapidly Changing Planet.” *Trends in Ecology & Evolution* 25: 241–249.
- Chapin III, F. S., E. U. Weber, E. M. Bennett, et al. 2022. “Earth Stewardship: Shaping a Sustainable Future Through Interacting Policy and Norm Shifts.” *Ambio* 51: 1907–1920.
- Cooke, S. J. 2021. “A Fisheries Take on the Fishy Decision to Implement a Double-Crested Cormorant Cull in Ontario.” *Avian Conservation and Ecology* 16: art16.
- Cooper, C., L. Larson, A. Dayer, R. Stedman, and D. Decker. 2015. “Are Wildlife Recreationists Conservationists? Linking Hunting, Bird-watching, and Pro-Environmental Behavior: Are Wildlife Recreationists Conservationists?” *The Journal of Wildlife Management* 79: 446–457.

- De Loë, R. C., N. Melnychuk, D. Murray, and R. Plummer. 2016. “Advancing the State of Policy Delphi Practice: A Systematic Review Evaluating Methodological Evolution, Innovation, and Opportunities.” *Technological Forecasting and Social Change* 104: 78–88.
- Doak, D. F., V. J. Bakker, B. E. Goldstein, and B. Hale. 2014. “What is the Future of Conservation?” *Trends in Ecology & Evolution* 29: 77–81.
- Dorr, B. S., S. L. Hanisch, P. H. Butchko, and D. G. Fielder. 2012. “Management of Double-Crested Cormorants to Improve Sport Fisheries in Michigan: Three Case Studies.” *Human-Wildlife Interactions* 6: 155–168.
- Dresner, M., C. Handelman, S. Braun, and G. Rollwagen-Bollens. 2015. “Environmental Identity, Pro-Environmental Behaviors, and Civic Engagement of Volunteer Stewards in Portland Area Parks.” *Environmental Education Research* 21: 991–1010.
- Dütschke, E., M. Frondel, J. Schleich, and C. Vance. 2018. “Moral Licensing—Another Source of Rebound?” *Frontiers in Energy Research* 6: 38.
- Forseth, I. N., and A. F. Innis. 2004. “Kudzu (*Pueraria montana*): History, Physiology, and Ecology Combine to Make a Major Ecosystem Threat.” *Critical Reviews in Plant Sciences* 23: 401–413.
- Gottwald, S., and R. C. Stedman. 2020. “Preserving Ones Meaningful Place or Not? Understanding Environmental Stewardship Behaviour in River Landscapes.” *Landscape and Urban Planning* 198: 103778.
- Griffin, A. S., A. Callen, K. Klop-Toker, R. J. Scanlon, and M. W. Hayward. 2020. “Compassionate Conservation Clashes with Conservation Biology: Should Empathy, Compassion, and Deontological Moral Principles Drive Conservation Practice?” *Frontiers in Psychology* 11: 1139.
- Harrison, H. L., S. Kochalski, R. Arlinghaus, and Ø. Aas. 2018. ““Nature’s Little Helpers”: A Benefits Approach to Voluntary Cultivation of Hatchery Fish to Support Wild Atlantic Salmon (*Salmo salar*) Populations in Norway, Wales, and Germany.” *Fisheries Research* 204: 348–360.
- Hühn, D., K. Lübke, C. Skov, and R. Arlinghaus. 2014. “Natural Recruitment, Density-Dependent Juvenile Survival, and the Potential for Additive Effects of Stock Enhancement: An Experimental Evaluation of Stocking Northern Pike (*Esox lucius*) Fry.” *Canadian Journal of Fisheries and Aquatic Sciences* 71: 1508–1519.
- Landon, A. C., G. T. Kyle, C. J. van Riper, M. A. Schuett, and J. Park. 2018. “Exploring the Psychological Dimensions of Stewardship in Recreational Fisheries.” *North American Journal of Fisheries Management* 38: 579–591.
- List, C. J. 2013. *Hunting, Fishing, and Environmental Virtue: Reconnecting Sportsmanship and Conservation*. Corvallis, OR: Oregon State University Press.
- Loreau, M. 2014. “Reconciling Utilitarian and Non-Utilitarian Approaches to Biodiversity Conservation.” *Ethics in Science and Environmental Politics* 14: 27–32.
- Lorenzen, K. 2014. “Understanding and Managing Enhancements: Why Fisheries Scientists Should Care.” *Journal of Fish Biology* 85: 1807–1829.
- Luque-Lora, R., A. Keane, J. A. Fisher, G. Holmes, and C. Sandbrook. 2022. “A Global Analysis of Factors Predicting Conservationists’ Values.” *People and Nature* 4: 1339–1351.
- Merritt, A. C., D. A. Efron, and B. Monin. 2010. “Moral Self-Licensing: When Being Good Frees Us to Be Bad.” *Social and Personality Psychology Compass* 4: 344–357.
- Organ, J., V. Geist, S. Mahoney, et al. 2012. *The North American Model of Wildlife Conservation*. The Wildlife Society Technical Review No. 12–04. Bethesda, MA: The Wildlife Society.
- Peçanha Enqvist, J., S. West, V. A. Masterson, L. J. Haider, U. Svedin, and M. Tengö. 2018. “Stewardship as a Boundary Object for Sustainability Research: Linking Care, Knowledge and Agency.” *Landscape and Urban Planning* 179: 17–37.
- Plummer, R., J. Baird, S. Farhad, and S. Witkowski. 2020. “How Do Biosphere Stewards Actively Shape Trajectories of Social-Ecological Change?” *Journal of Environmental Management* 261: 110139.

- Radinger, J., S. Matern, T. Klefoth, et al. 2023. "Ecosystem-Based Management Outperforms Species-Focused Stocking for Enhancing Fish Populations." *Science* 379: 946–951.
- Reid, A. J., L. E. Eckert, J. Lane, et al. 2021. "'Two-Eyed Seeing': An Indigenous Framework to Transform Fisheries Research and Management." *Fish and Fisheries* 22: 243–261.
- Riepe, C., M. Fujitani, J. Cucherousset, et al. 2017. "What Determines the Behavioral Intention of Local-Level Fisheries Managers to Alter Fish Stocking Practices in Freshwater Recreational Fisheries of Two European Countries?" *Fisheries Research* 194: 173–187.
- Shephard, S., C. J. List, and R. Arlinghaus. 2023. "Reviving the Unique Potential of Recreational Fishers as Environmental Stewards of Aquatic Ecosystems." *Fish and Fisheries* 24: 339–351.
- Shephard, S., E. von Essen, T. Gieser, C. J. List, and R. Arlinghaus. 2024. "Recreational Killing of Wild Animals Can Foster Environmental Stewardship." *Nature Sustainability* 7: 956–963.
- Stern, P. C. 2000. "Toward a Coherent Theory of Environmentally Significant Behavior." *Journal of Social Issues* 56, no. 3: 407–424.
- Takekawa, J. Y., J. T. Ackerman, L. A. Brand, et al. 2015. "Unintended Consequences of Management Actions in Salt Pond Restoration: Cascading Effects in Trophic Interactions." *PLoS ONE* 10: e0119345.
- Teisl, M. F., and K. O'Brien. 2003. "Who Cares and Who Acts?: Outdoor Recreationists Exhibit Different Levels of Environmental Concern and Behavior." *Environment and Behavior* 35: 506–522.
- Turoff, M., and H. A. Linstone. 1975. *The Delphi Method: Techniques and Applications*. Reading, MA: Addison-Wesley Publishing Co.
- West, S., L. J. Haider, T. Hertz, M. Mancilla Garcia, and M. L. Moore. 2024. "Relational Approaches to Sustainability Transformations: Walking Together in a World of Many Worlds." *Ecosystems and People* 20: 2370539.
- West, S., L. J. Haider, V. Masterson, J. P. Enqvist, U. Svedin, and M. Tengö. 2018. "Stewardship, Care and Relational Values." *Current Opinion in Environmental Sustainability* 35: 30–38.

### Supporting Information

Additional supporting information can be found online in the Supporting Information section.