CONTRIBUTED PAPER

Peace in the valley? Qualitative insights on collaborative coexistence from the Wood River Wolf Project

Jeff Vance Martin

Department of Geography, University of California, Berkeley, California

Correspondence
Jeff Vance Martin, 505 McCone Hall #4740, Berkeley, CA 94720-4740.
Email: j.vance.martin@gmail.com

Funding information
UC Berkeley Department of Geography; The Gray Brechin and Robert Chlebowski Endowed Graduate Student Support Fund in Geography; UC Berkeley Social Science Matrix; UC Berkeley Center for Right Wing Studies

Abstract
Threats posed by wild predators to livestock production have too often resulted in human–wildlife conflict, to the detriment of these keystone species and broader biodiversity conservation. Long-standard practices of lethal control are increasingly seen as costly, controversial, and ineffective, however, with nonlethal alternatives ever more prominent. In addition to assessing these tools’ ecological effectiveness, there remains a key role for the social sciences, particularly qualitative research, in identifying obstacles to and opportunities for the long-term sustainability and scaling up of these coexistence interventions. The Wood River Wolf Project (WRWP), a collaboration among ranchers, environmental organizations, and government agencies in Blaine County, Idaho, has pursued coexistence between gray wolves and domestic sheep since 2008, demonstrating and developing nonlethal techniques and garnering regional and international attention as a model for collaborative coexistence. Yet the Project has also struggled with changing conditions and internal challenges. Investigation of this prominent effort—its history and practices as well as the broader socio-political and economic context—highlights the challenges of adaptive governance in the face of reduced capacity and hostile legal-political contexts, while providing important insights for practitioners and policymakers promoting wildlife coexistence in shared landscapes.

KEYWORDS
adaptive governance, American West, convivial conservation, environmental conflict, gray wolves, human–wildlife conflict, livestock depredation, predator coexistence, wildlife management, wolf reintroduction

1 | WOLF CONFLICT AND COEXISTENCE

Threats posed by wild predators to human livelihoods, particularly livestock production, have too often resulted in human–wildlife conflict (HWC) to the detriment of biodiversity conservation (Dickman, 2010; Treves & Karanth, 2003; Woodroffe, Thirgood, & Rabinowitz, 2005). Long-standard practices of lethal control, however, are increasingly controversial and have been shown costly and ineffective over longer timescales (Berger, 2006; Lennox, Gallagher, Ritchie, & Cooke, 2018; Moreira-Arce, Ugarte, Zorondo-Rodriguez, & Simonetti, 2018; Slagle, Bruskotter, Singh, & Schmidt, 2017; Treves, Krofel, & Mcmanus, 2016; van Eeden, Dickman,
Ritchie, & Newsome, 2017). Nonlethal strategies for coexistence are thus ever more prominent, along with efforts to assess their ecological effectiveness (Miller et al., 2016; van Eeden et al., 2018; Wilkinson et al., in press). Yet there remains a key role for the social sciences, particularly qualitative research, in identifying obstacles to and opportunities for long-term sustainability and upscaling of coexistence interventions (Bruskotter & Shelby, 2010; Glikman, Frank, & Marchini, 2019; Treves, Wallace, Naughton-Treves, & Morales, 2006).

Federal reintroduction of gray wolves (Canis lupus) to Yellowstone National Park and Central Idaho in 1995 and 1996 has been characterized as one of the great success stories of 20th century conservation (Mech, 1995; Randall, 2020). Wolves serve as keystone species—contributing to landscape-level restoration through trophic cascade effects on prey populations and the broader ecosystem (Ripple & Beschta, 2005, 2012)—as well as charismatic symbols and potential bases for ecotourism revenues (Lorimer, 2015; Macdonald et al., 2017; Moore, 1995). These effects are debated, context-specific, and unevenly experienced (Haswell, Kusak, & Hayward, 2017; Mech, 2012; Middleton, 2014), however, and wolves’ effects on rural residents—particularly through livestock depredation, but compounded by cultural and political polarization surrounding these animals (Coleman, 2009; Nie, 2003)—have made them an emblematic instance of HWC even 25 years since their return to the intermountain West.

Interventions aimed at predator coexistence, however, are increasingly promoted regionally and globally (Fascione, Delach, & Smith, 2004; Frank, Glikman, & Marchini, 2019; Woodroffe et al., 2005). The Wood River Wolf Project (WRWP, or the Project), a collaboration between ranchers, government agencies, and environmental nongovernmental organizations (ENGOs) in Blaine County, Idaho, is one early exemplar. The WRWP has pursued coexistence between wolves and livestock since 2008, demonstrating and developing nonlethal techniques, grazing thousands of sheep while boasting the lowest loss rates in the state, amid a populace and state government at times vehemently opposed to wolf presence. This success has garnered the Project international attention as a model for collaborative coexistence between conservation and rural livelihoods, holding out the promise of a peaceful end to the wolf wars (cf. Fischer, 1995; Keim, 2017).

In what follows, I first highlight the value of qualitative social science engagement with predator issues, including specific methods employed and how these might inform adaptive governance. I then lay out essential elements of the WRWP’s emergence in Blaine County, Idaho following wolf reintroduction. From here, I review the Project’s tools and practices, including lessons learned over a decade of implementation amid changing circumstances. Drawing on my qualitative research insights, I then highlight three central challenges the Project has faced and the hurdles these pose for long-term sustainability and upscaling. I conclude by emphasizing the value of insights from the WRWP for promotion of shared landscapes and convivial conservation regionally and globally (cf. Büscher & Fletcher, 2019; Oriol-Cotterill, Valeix, Frank, Riginos, & Macdonald, 2015; Rosenzweig, 2003; Western, Macdonald, Loveridge, & Dickman, 2019).

## 2 Qualitative Social Science and Adaptive Governance

Conservation and environmental conflicts are widely-recognized as wicked problems—multi-scalar challenges involving diverse stakeholders, dynamic socio-natural interrelationships, and a resistance to simple resolution (DeFries & Nagendra, 2017; Mason et al., 2018; Rittel & Webber, 1973). Human–wildlife conflict and coexistence follow this pattern, with an expressed need for more holistic analysis and interventions, including social-ecological systems thinking and adaptive governance (AG) approaches (Carter et al., 2019; Glikman et al., 2019). AG is an emerging framework within environmental governance for analyzing and intervening around complexity, change, and uncertainty. AG brings adaptive management (Holling, 1978; Schreiber, Bearlin, Nicol, & Todd, 2004; Walters, 1986) together with social context, emphasizing local collaboration and comanagement (Armitage et al., 2009; Sterling et al., 2017). AG thus focuses on the social conditions that enable adaptive ecosystem management, a “range of interactions between actors, networks, organizations, and institutions emerging in pursuit of a desired state for social-ecological systems” (Chaffin, Gosnell, & Cosens, 2014).

Achieving coexistence between predators and human activities, the desired state implied in much of the HWC literature, requires mainstreaming and institutionalizing in order to increase interventions’ reach, legitimacy, and long-term sustainability (Carter & Linnell, 2016; Linnell & Kaltenborn, 2019; Marchini et al., 2019; cf. Young et al., 2013). This, in turn, requires knowledge transfer, social learning, and the scaling up of localized insights and practices. Doing so requires identification of obstacles and opportunities, including engagement with broader societal dynamics or “human dimensions.” Within this, there is a growing recognition of the value of qualitative social science methods and data (e.g., Drury,
Homewood, & Randal, 2011; Glikman et al., 2019), despite ongoing challenges of translation across disciplinary and epistemological divides (the “two cultures problem”) (Adams, 2007).

Discussing the value of qualitative research for understanding ranch management, Sayre points to its attentiveness to context and historical change, greater methodological flexibility, and ability to reveal unanticipated factors and questions (in contrast, “quantitative research can answer only the questions it chooses to pose”) (2004, p. 671). Sterling et al. emphasize the value of qualitative methods for evidence-based planning and decision-making, and qualitative analysis for data that “require subjective interpretation amidst complex and difficult-to-understand patterns of causality” (2017, p. 168). Qualitative methods—interviews, ethnographic observation, participation, and archival research—iteratively evolve through the research process, with questions discovered or modified in response to findings. Qualitative studies are generally smaller and nonrandom, situated in and tailored to context (emphasizing the value of the case study), and thus not replicable. A relational approach to place and the identification of key dynamics, however, can highlight processes that extend beyond local geography and inform subsequent research design (Sayre, 2004, p. 671; cf. Glikman et al., 2019, p. 440).

Qualitative insights can help identify policies and structures that either incentivize or discourage shifting norms and practices. Toward these ends, I leave aside cognitive questions of attitudes, values, and tolerance emphasized in the literature (cf. Bruskotter & Wilson, 2014; Carter, Riley, & Liu, 2012; Manfredo et al., 2016; Treves & Bruskotter, 2014) in favor of a structural analysis informed by political ecology in the interest of conflict transformation (Büschér & Fletcher, 2019; Madden & McQuinn, 2014; Martin et al., 2019). Between 2015 and 2017, I conducted an intensive case study of the WRWP and its partners in Blaine County, Idaho and the surrounding region, using a mixed methods approach centered on the Project’s history, practices, and broader context. Research included participant observation at sites of livestock production (ranches, rangelands, processors, and farmers markets; sheep trailing, loading, and 4-H community events), as well as assisting with WRWP activities (visiting herders and staff in the field, conducting howl surveys and community outreach, and contributing to collaborator meetings, conferences, and weekly planning). I conducted over 40 semi-structured interviews with Project partners and related stakeholders, including ranchers, government agents (from county commissioners and local mayors up to federal agency representatives), and staff from several ENGOs, complemented by informal conversations among stakeholders and in the wider community. These were supplemented by investigations at local archives—Idaho State Archives in Boise, and the Regional History Department of the Community Library in Ketchum—as well as reviews of agency and organization publications.

Although gray wolves in the Northern Rocky Mountain region are among the most studied populations of large carnivores in the world, Idaho has received significantly less attention from scholars (cf. Young, Ma, Laudati, & Berger, 2015), even as its multiple-use landscapes are more akin to those places where wolf populations continue to expand than Yellowstone National Park. Idaho is also an important site for long-standing struggles over livestock grazing on public lands (Rowley, 1985; Wuerthner & Matteson, 2002), relevant to ongoing debates over conservation in working landscapes (Green, Cornell, Scharlemann, & Balmford, 2005; Kremen & Merenlender, 2018; Phalan, Onial, Balmford, & Green, 2011). The WRWP itself represents a prominent coexistence collaborative around an emblematic instance of HWC, an early adopter and developer of methods that have increasingly become best practices in the region and around the world.

My research builds on studies conducted on the technical and ecological effectiveness of these nonlethal tools and techniques (notably Stone et al., 2017), while highlighting the challenges of implementation, long-term sustainability, and upscaling of the WRWP’s coexistence model. Although the Project has been immensely successful since its initiation in 2008, it has also grown, evolved, and contended with internal and external difficulties. Qualitative investigation of both of its successes and failures (cf. Sterling et al., 2017, p. 168) can provide crucial insights for managers, producers, and conservationists (particularly as wolves expand into working landscapes throughout the region), and should help planners and policy-makers better navigate and support adaptive, collaborative solutions to similar challenges in other systems.

3 BLAINE COUNTY AND THE WOOD RIVER WOLF PROJECT

Although once widespread in North America, landscape-level extermination resulted in the near-complete extirpation of gray wolves from the contiguous United States by the 1930s. Mid-century scientific and cultural revaluation, however, led to early protection under the Endangered Species Act (ESA) followed by unprecedented federal reintroduction several decades later. Per section 10 (j) of the ESA, wolves were released into Central Idaho and Yellowstone National Park in 1995 and 1996 as an
“experimental, nonessential” population, allowing for greater management flexibility—including usage of lethal control of depredating “problem wolves” (Bangs & Fritts, 1996; Fischer, 1995). Despite socio-political conflict surrounding wolves’ return, populations grew steadily in number and range, hitting recovery targets in 2000 and triggering the process of ESA delisting. Following a decade of legal back-and-forth, delisting was pushed through via federal budget bill rider in 2011,1 devolving wolf management to the state of Idaho under a 5-year federal oversight period concluding in 2016.

Idaho is home to both the highest percentage of state land under U.S. Forest Service (USFS) management and the largest contiguous federally-managed wilderness outside of Alaska—providing substantial wolf habitat and accounting for its choice as a site of reintroduction (Our Public Lands, n.d.; USFS, n.d., 2012). Yet much of the state is governed as multiple-use,2 with livestock grazing continuing alongside recreation and conservation (cf. Rowley, 1985). Situated between the Sawtooth Mountains to the north and Craters of the Moon and the Snake River to the south, Blaine County is a crucible of so-called New West dynamics, including the decline of extractive industry dominance vis-à-vis a growing recreation- and service-based economy, and related pressures of rural gentrification (Baden & Snow, 1997; Hines, 2010; Robbins, Meehan, Gosnell, & Gilbertz, 2009; Walker & Fortmann, 2003).

Blaine County is also a political outlier in the generally conservative Idaho—often referred to as “an island of blue in a sea of red”—and hosts a veritable ecosystem of ENGOs, from those with explicitly anti-grazing aims to efforts around collaborative range management (cf. Stevens, 2014; Wuerthner & Matteson, 2002). While the state has been a bastion of anti-wolf sentiment and activism (Associated Press, 2002; Ring, 2008), Blaine

![FIGURE 1](image_url) Project Area of the Wood River Wolf Project. The Wood River Wolf Project Protected Area consists of U.S. Forest Service allotments along the Big Wood River drainage. It has expanded since initial establishment in 2008, and today covers over 1000 square miles of Sawtooth National Forest lands in Blaine County, Idaho. Since the 1880s, grazing in the Wood River Valley has followed a transhumance cycle: herders trail their charges north from the Snake River Plain in the spring, following the “green up” into the mountains for summer, and then back down to home ranches in the fall. Today’s grazing season runs from approximately May through October, during which bands of 1,000–1,500 sheep traverse public and private holdings up valley. Many grazing allotments, including all of those in the Ketchum Ranger District, are currently permitted as sheep/goat allotments due to the rugged terrain. Map modified from the original by Avery Shawler, former WRWP Coordinator (reproduced with permission)
County appears as a hub of tolerance: even prior to reintroduction, the work of the Dutchers outside of Stanley laid important groundwork for public acceptance (Dutcher, Dutcher, & Manfull, 2013). Meanwhile regional development—including an influx of residents not tied to agriculture and with contrasting environmental values—made for a population generally opposed to lethal control (cf. Clark, Rutherford, & Casey, 2005; Nie, 2002, 2003).

Defenders of Wildlife (DoW), a national environmental nonprofit, had been a key player in wolf politics for some time prior to the founding of the WRWP. DoW helped finance and facilitate reintroduction and was a major force in lawsuits against (from their perspective) premature delisting. The organization provided financial assistance for depredation losses through their Wolf Compensation Trust, paying out more than $1.4 million to regional livestock producers before these efforts were taken up by a joint federal and state program in 2010 (DoW, 2010). And as early as 1999, DoW was experimenting with nonlethal deterrents, building up experience and their Wolf Guardians Program for protecting livestock (Stone, 2014).

In 2007, a pack of wolves formed in the Sawtooth National Recreation Area, just north of the Wood River Valley in Blaine County. Part of Idaho’s “sheep superhighway,” these lands had some of the highest concentrations of sheep on public lands in the state, making for a potential conflict hotspot (Figure 1). That year, the Phantom Hill Pack killed nine sheep and a guard dog in the Wood River Valley when a band was grazed too near the wolves’ den site. DoW met with ranchers, the Idaho Department of Fish and Game (IDFG), and the local USFS district, receiving their approval to try out nonlethal methods. Moving quickly to hire a field technician and get staff camping out with the sheep, DoW’s field test was a success, with no further depredations that season. Based on this effort, the Blaine County Commission voted to contribute seed money to the incipient Wood River Wolf Project, which was officially formed in 2008 (Table 1).

### 4 | TO CONSERVE AND PROTECT

Domestic sheep (*Ovis aries*) are particularly vulnerable to wolf depredation, falling prey in much greater relative

| Phase   | Dates        | Milestones                                                                 | Description                                                                                     |
|---------|--------------|-----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Field test | 2007        | • 2007: Phantom Hill depredation incident.                                   | Defenders of Wildlife coordinates with ranchers and government agencies to provide field technician and staff assistance for remainder of the grazing season. |
| Phase I | 2008–2010    | • 2008: Blaine County Commission contributes funds to help start WRWP.       | Project officially established as a collaborative.                                              |
|          |              | • 2010: Federal program takes over livestock depredation compensation, freeing up DoW resources for “Wolf Coexistence Partnerships” (DoW, 2010). |                                          |
| Phase II | 2011–2014    | • 2011: Project area expands.                                               | With ongoing community interest, DoW continues sponsorship of Project, developing and demonstrating new tools and refining techniques. Transition to direct employment of deterrents by herders and livestock operators, with Project personnel as consultants and intermittent field assistants. |
|          |              | • 2011: ESA delisting, wolf management devolved to Idaho state (IDFG).       |                                          |
|          |              | • 2014: City of Ketchum issues Resolution 14-022 recognizing the value of the WRWP. |                                          |
| Phase III | 2015—present | • 2015: Lava Lake Institute for Science and Conservation (501(c)(3) nonprofit) takes over from DoW as fiscal agent for WRWP. | Project continues emphasis on herder training and direct deployment of deterrents, including development of band kit for easier transport and use. |
|          |              | • 2016: WRWP issues official mission statement: “The Wood River Wolf Project collaborative promotes the coexistence of livestock and wolves by proactively using nonlethal measures to prevent depredation.” |                                          |
|          |              | • 2017: Stone et al. published, documenting results from first 7 years of the Project. |                                          |
numbers than cattle, including via pileups and surplus killing (Levy, 2013; Muhly & Musiani, 2009). Reactive lethal control has been standard practice in Idaho since the early years of reintroduction, with aerial gunning, hunting, trapping, and snaring coordinated between IDFG and Wildlife Services (WS). Yet lethal control’s effectiveness has been widely questioned, with significant public debate and low consensus among conservation professionals (Lute, Carter, López-Bao, & Linnell, 2018; Moreira-Arce et al., 2018; Nie, 2002). Ranchers and public agencies have thus increasingly aimed for deterrence: avoiding or reducing interaction between predators and livestock and hence the likelihood for depredation and social conflict.

For over a decade and across more than 1,000 mile² of western range, the WRWP has demonstrated the feasibility of shared space between wolves and livestock. While not meeting “gold standard” rigor of a controlled experiment (van Eeden et al., 2018)—the WRWP was designed as a test case and management intervention rather than a scientific study—Stone et al. (2017) demonstrate the effectiveness of the Project’s suite of interventions compared to outcomes outside the protected area. During the grazing season, when wolf-sheep interactions on national forest grazing allotments are most likely, the WRWP coordinates with livestock producers and government agencies to keep wolves away and losses to a minimum. Project staff communicate with collaborators (sharing information and gathering on-the-ground insights from them), and when needed meet with herders on the range to deliver, demonstrate, or directly deploy deterrents—aiming to make lethal control a last resort, to be used only after preventative and nonlethal efforts have failed.

The WRWP promotes coexistence by reducing negative interactions between wolves and livestock (Table 2). Three broad strategies—(1) avoiding interactions through reconnaissance; (2) proactive management through livestock husbandry; and (3) keeping wolves away through hazing techniques and mechanical tools—all emphasize avoidance and deterrence (cf. Miller et al., 2016; Much, Breck, Lance, & Callahan, 2018; Wilkinson et al., in press). Relying on wolf neophobia to induce a landscape of fear, these interventions aim to increase perceived costs of preying on sheep, redirecting predation onto wild ungulates instead (Iliopoulos et al., 2019; Miller & Schmitz, 2019). Such efforts promote management of the public range for both wildlife habitat and human livelihoods, a form of landscape-scale coexistence.

4.1 Reconnaissance

Attaining even baseline information on wolf population and distribution is a perennial challenge (Ausband, 2016; Ausband et al., 2014). What information can be gathered, however, can structure grazing patterns and direct deployment of labor and deterrents. As one WRWP rancher and steering committee member noted, “If we know where the wolves are, we can minimize interaction. If we don’t, our first indication that they are in the area is when we see them 200 yards from the sheep” (Wutz, 2011).

Early on, the Project used telemetry scanners as a key tool for avoidance, allowing herders to preemptively move bands away from known wolf locations. A radio-activated guard system (RAG boxes) triggered by wolf presence provided a backup warning system. However, these tools relied on radio-collaring conducted by the U.S. Fish and Wildlife Service and later IDFG. As IDFG moved away from collaring due to cost concerns and shifting management priorities, these and similar methods became unusable (Martin, in press).

In Phase 3, the WRWP has thus used a combination of trail cameras, howl surveys, and public communication to build a picture of wolf presence on the landscape. Such methods are time- and labor-intensive, however, and have notable limitations (howl surveys, for instance, demonstrate presence but not absence, and require hours trekking into the backcountry; see Figure 2). These techniques also lack the precision and immediacy of radio-collaring and telemetry: camera surveys require manual review of thousands of photographs, often taking place days or weeks after their capture in the field, making them unfit for real-time adjustments in practice.

4.2 Husbandry

Rangeland sheep operations necessitate herding, and WRWP partner ranchers practice low- to high-intensity husbandry and occasional night enclosure as dictated by grazing regulations, local conditions, and operator preference (cf. Graham et al., 2005). Although grazing largely follows pre-established agency plans, these are sufficiently flexible—especially with the USFS part of the collaborative—to allow for modification to reduce grazing impacts and avoid areas of known wolf activity.

Livestock guardian dogs have long been used in the region to defend bands against coyotes and other threats. These “big white dogs” (largely Great Pyrenees, Akbash, or crosses thereof) are raised with ewes to form a tight and protective bond with the sheep. Deployed with the bands, dogs perform both an alarm and defensive function: barking when they sense predators to alert herders and hopefully drive the threat away, and giving chase or standing between approaching wolves and livestock, at
times at the cost of their own lives. Use of dogs must be strategic, however, as animals are costly (several hundred dollars each, plus feed, and care), and can cause problems when deployed near recreationists (where their size and demeanor can evoke fear) or wolf den sites (where they provoke defensive reactions from territorial packs).

Human presence remains the most effective tool for keeping wolves away. Suzanne Stone, then DoW’s

### Table 2: Nonlethal tools and techniques used by the WRWP

| Type                | Tool                        | Notes                                                                 |
|---------------------|-----------------------------|----------------------------------------------------------------------|
| Reconnaissance      | Telemetry scanners          | • Hand-held receivers to track radio-collared wolves.                |
|                     |                             | • Defunct (IDFG no longer using large-scale radio-collaring/tracking of wolves ca. 2015.)|
| Radio-activated guard (RAG) boxes |                             | • Alarm triggered by presence of radio-collared wolves.             |
|                     |                             | • Defunct (IDFG no longer using large-scale radio-collaring/tracking ca. 2015.)|
| Trail cameras       |                             | • Motion-triggered, noninvasive.                                    |
|                     |                             | • Combination of IDFG-provided and Project-owned.                   |
|                     |                             | • Recent cameras (2018–2019) acquired and deployed as part of a collaboration with Boise State University.|
| Howl surveys        |                             | • Recordings of wolf howls played at dawn/dusk in backcountry locations; wolf responses noted. |
|                     |                             | • Requires overnight backpacking.                                   |
| Public communication|                             | • Farmer’s market tabling; trail signage; web and social media communication.    |
|                     |                             | • Inform public, promote Project, gather wolf sighting information. |
| Husbandry           | Active management           | • Herding of livestock to avoid known wolf locations.               |
|                     |                             | • Rapid treatment of sick and injured animals.                      |
|                     |                             | • Carcass removal to reduce attractants to predators.               |
| Livestock guardian dogs |                             | • Great Pyrenees, Akbash, or cross-bred.                           |
|                     |                             | • 2–3+ deployed with bands: Alert herders and drive off predators. |
|                     |                             | • May be outfitted with nail-spiked collars for extra protection.  |
| Human presence      |                             | • Herders, WRWP staff, and/or community volunteers.                 |
|                     |                             | • Includes proactive and reactive deployment of mechanical tools.   |
| Mechanical—light    | Foxlights                   | • Computerized flash with nine LED bulbs simulates flashlight patrol; projects 360 degrees up to 1 km away (solar- and battery-powered available). |
|                     |                             | • Invented/developed by Australian sheep farmer Ian Whalan, first used in the United States by the WRWP. |
| Spotlights          |                             | • High-intensity lamps (500 lm).                                   |
|                     |                             | • Used in conjunction with herder headlamps.                       |
| Mechanical—sound    | Starter pistol              | • Shoots .22 blanks, providing sudden loud noise.                  |
|                     |                             | • Safer alternative to live ammunition.                            |
|                     |                             | • Reduces chance of accidental wildfire.                           |
| Boombox, wireless speakers |                             | • Loud music is unfamiliar on the range; extends spatial reach / alerts predators to human presence. |
| Air horn            |                             | • Loud and jarring noise, used for hazing.                         |
| Mechanical—barrier  | Fladry, “Turbofladry”       | • Mobile fencing, flags (tape/cloth) hung at 18° intervals on polypropylene cording or similar using temporary fence posts (metal or fiberglass). |
|                     |                             | • “Turbo” developed by Rick and Carol Williamson; adds battery-powered electrification, particularly effective at night. |
northwestern regional wolf conservationist and a founder of the WRWP, relates chasing wolves out of a sheep band by banging on a pot with a wooden spoon. Human presence is also, however, the most challenging tool to consistently implement. Under DoW leadership the Project maintained a paid field staff that could spend the night with bands under threat, but such practices are no longer feasible at the same scale and level of reliability. As one former Project Coordinator noted, “…we don’t have the time or money or staff to go out…in quote-unquote ‘full guardian mode’…you just simply can’t cover the same amount of ground with a tiny staff.”

4.3 Mechanical

Mechanical tools are those most typically referred to as nonlethal deterrents, and include light, sound, and barriers deployed ahead of and in response to known wolf presence. These tools can be effective and labor-saving, but skepticism comes from stories or experiences of improper deployment—making one of the Project’s major aims to correctly demonstrate and train others in their proper use.

Fladry is a simple and cost-effective mobile fencing system based on historical practices from Eastern Europe (Iliopoulos et al., 2019; Musiani et al., 2003). Rick Williamson, the late Wildlife Services agent and WRWP collaborator, made fladry “turbo” by adding electrification, while his wife, Carol, constructed the first miles of the new tool on her sewing machine (Stone, 2014; Wutz, 2011). In the Project Area this tool was found too labor intensive—carrying and installing fence posts in the rocky and remote conditions of Idaho sheep range was often more trouble than it was worth—though it has become prominent throughout the region (Baca, 2019). Foxlights (first used in the United States by the WRWP) deter by simulating a person walking with a flashlight, while boomboxes “stretch” fear effects beyond active human presence—both have become useful preemptive tools for night bedding, when sheep are often most vulnerable to depredation.

Over a decade of adaptive deployment and institutional learning, the Project has shown that there is no “silver bullet” or one-size-fits-all approach to deterrence: tools must be adapted to context and used in rotation and combination to avoid wolf habituation to any individual deterrent. Beginning in Phase 2, the Project moved away from direct deployment toward herder training in and use of deterrents. The Project now uses the band kit, a collection of tools in a duffel bag meant to accompany each sheep band, to help facilitate adaptive deployment by herders themselves.
5 | ADAPTATION AND ITS LIMITS

On September 13th, 2018, a Wildlife Services agent shot and killed a young male wolf on Forest Service lands east of Sun Valley, Idaho. While not atypical in the state, this was the first instance of lethal control in the Project Area since the creation of the WRWP. More frustratingly, the call came from one of the Project’s own long-time partners. That rancher reported that his herders had used guns to try to scare off wolves and posted an extra man with the sheep, but still lost 10 to depredation, along with guard dogs killed and injured. Subsequent WRWP investigation, however, noted that the herder camp was set up more than two miles from the bands, and that none of the band kits provided (over $9,000 worth of equipment) were with the sheep (Moore, 2018).

Over more than a decade of applied efforts, the WRWP has demonstrated both the potential and pitfalls of an adaptive governance approach to wolf-livestock coexistence. Nonlethal tools and techniques have been shown to be effective, efficient, and reliable: properly applied, deterrence can reduce depredation over significant time and spatial scales and thus the need for lethal control (cf. Much et al., 2018; van Eeden et al., 2018). Through adaptive “learning-by-doing” (Stone, 2014), the WRWP developed or refined many of the tools now emerging as nonlethal best practices in similar systems across the region (cf. Baca, 2019). Knowledge transfer, both among its partners and through regional trainings, helped the Project combat skepticism and resistance from operators and wildlife managers.

Since 2008, however, the WRWP has had to contend with changing conditions—from delisting to the end of DoW sponsorship—which have raised important questions around the limits of technical interventions and the challenges of long-term viability. Following Schusler, Decker, and Pfeffer (2003), social learning is essential yet insufficient: capacity, supportive policy, and appropriate structures are crucial for successful adaptive governance (cf. Chaffin et al., 2014). Long-term sustainability and scaling up of the WRWP’s collaborative coexistence model require sober assessment of these challenges. Drawing on insights from qualitative research on the Project’s history, partners, and broader context, I review three key obstacles for the WRWP and similar coexistence efforts: the economic costs of conservation; the effects of contrary policy; and the socio-political challenge of collaboration amid polarization.

5.1 | Conservation Costs Money

Ranchers and rural residents frequently complain that while urbanites and environmentalists like wolves, they do not have to bear the costs and consequences of living with them. As one rancher put it, “conservation costs money.” Nonlethal methods are time-, labor-, and resource-intensive, and require a transition away from historically-established practices and norms. Although elimination of wild predators is also costly—involving helicopters, trained sharpshooters, and trackers—these are borne not by individual operators but distributed through a broader taxpayer base. As WRWP leadership has critically noted, producers obtain effectively free lethal control just by “picking up the phone.”

The WRWP has done much to subsidize and support operators around the added costs of nonlethal tools: Project staff and volunteers provide free labor for coordination, distribution, and deployment; grant money has gone to development and free provision of band kits; and the Project has cosponsored educational workshops and trainings in various practical techniques. Yet the WRWP has also struggled with the costs of sustaining itself, particularly since the Phase 3 transition. With a much-reduced staff, the Project has had to modify its practices and put more on remaining employees and volunteers. The Project is further limited by the cycles of nonprofit funding and fluctuating popular attention—one former Project Coordinator noted they spent less time coordinating the Project’s activities and more time trying to fund it.

While attacking subsidies has become “boilerplate political and environmental strategy,” subsidy and taxation are key ways in which states and societies support and discourage particular behaviors; the issue is “in which direction these subsidies should flow” (Nie, 2002, p. 69; cf. Wuerthner & Matteson, 2002). Such questions are part of broader debates on funding conservation (Malcolm et al., 2019; cf. Martin, in press), and link up with calls for public investment to shift agriculture to more sustainable approaches (Montenegro, Shattuck, & Sbicca, 2019). As with depredation compensation, it may be time for a public agency to step in to provide at a scale a small nonprofit simply cannot. Project collaborators have themselves expressed the desire that WS might build on the WRWP model, in turn fulfilling their own mission to “improve the coexistence of people and wildlife” (Wildlife Services, 2015). WS’s research arm at the National Wildlife Research Center in Fort Collins, Colorado, has been developing tools for predator coexistence for over two decades (Kinka & Young, 2019; Young, Draper, & Breck, 2019), and the agency has begun to promote nonlethal deterrents in collaboration with livestock producers around the country (Baca, 2019; Few, Sherry, Talmo, Steuber, & Baca, 2019; Strong, 2019)—although much less so in Idaho.
5.2 Contrary Incentivization

While allowed under the ESA 10(j) designation, prior to delisting Idaho was under pressure to limit lethal control in order to maintain a viable wolf population in the state. A 2002 lawsuit further resulted in a temporary injunction on lethal control within the Sawtooth National Recreation Area\textsuperscript{11}; emergence of the WRWP 5 years later demonstrates the value of legal-regulatory pressures for encouraging adoption of nonlethal alternatives. Since 2016, however, keeping wolves alive has become less of a state management imperative. Combined with the continuation of “no strings attached” compensation—zero requirements that operators adopt preventative practices in order to qualify—there is little in the way of regulatory pressure toward adaptation.

Indeed, the Idaho state legislature has made explicit declarations against wolf presence in the state, including in the 2002 wolf management plan.\textsuperscript{12} Since delisting, Idaho has extended public “harvest”—wolf trophy hunting seasons—as part of a strategy to reduce overall numbers. In 2014 then Governor Otter authorized the Idaho Wolf Control Board, a separate body from the IDFG with state funding—$2 million over 5 years—going exclusively to lethal control (DoW, 2014). In 2020, IDFG approved rules to define much of southern Idaho as a “wolf-free zone” with year-round hunting seasons (Moore, 2020).

These practices continue despite their associated costs, questionable benefit to industry, broader public opposition, and, of course, the availability of nonlethal alternatives (Berger, 2006; Lennox et al., 2018; van Eeden et al., 2018). Regardless of their rationale, such policies reinforce a narrative of crisis and incompatibility between wolves and livestock, rather than one of adaptation (cf. Carter & Linnell, 2016). Project partners are understandably cynical, noting a system “set up” to make it easy to kill predators; to quote Stone, “it’s still the dark ages in Idaho.” Nonlethal methods have no federal or state support comparable to extant programs for lethal control, making coexistence in Idaho reliant exclusively on the choices of individual ranchers in their pursuit of noneconomic values (Smith & Martin, 1972; Sayre, 2004; cf. Manfredo et al., 2016). Linnell, Swenson, and Anderson (2001) note the feasibility of predator coexistence under favorable policy contexts, but the converse is obviously also true: unfavorable state policies discourage and undermine efforts at coexistence (cf. Hutton & Leader-Williams, 2003; Nie, 2004).

5.3 Complicating Collaboration

The WRWP has emphasized collaboration as a key part of its overall effort and identity since its initiation. Project discourse reflects the win-win priorities recognized in the literature around environmental conflicts: seeking common ground among stakeholders with divergent interests through empowerment, trust-building, and conflict transformation (cf. Charnley, Sheridan, & Nabhan, 2014; Frank & Glikman, 2019; Madden & McQuinn, 2014; Rosenzweig, 2003; Treves et al., 2006). In practice, however, collaboration is no easy task, and the Project continues to struggle with buy-in from its own partners.

Given a history of environmentalist-rancher tensions around grazing on public lands, distrust and skepticism were often bubbling beneath the surface. The Wood River Valley is home to groups that saw DoW as “traitors” for working with ranchers, and both the Project and deterrence itself have been called out as “a delusion” (Wuertzner, 2017). Working together became difficult when ENGOs were elsewhere involved with policy and litigation viewed by some livestock producers as an attack. Ranchers expressed feeling “stabbed in the back,” including during the long debacle surrounding delisting in which DoW played a central role. This dynamic in part accounts for DoW’s decision to step away from leadership in Phase 3: the organization’s prominent association was a red flag for many, while local leadership made collaboration far more palatable.

Anti-wolf sentiment is deep-seated, bound up with long-standing societal tensions around belonging, appropriateness, and regional transformation (cf. Baden & Snow, 1997; Brick & Cawley, 1996; Cronon, 1996; Hays, 2017; Martin et al., 2019; Wilkinson, 1992). What is an acceptable risk of depredation thus becomes deeply political, with wolves understood in profoundly different ways than other threats to livestock or even other predators, based in part on how they have been enrolled in broader regional politics. Participation, as Sterling et al. note, is a process of continual and nonlinear negotiation (2017, p. 166), highlighting the need for adaptive governance approaches. Yet engagement with the deeper drivers of conflict in the interest of conflict transformation may exceed the means of local collaboratives. HWC, particularly around contentious and charismatic species like wolves, likely necessitates a multi-scalar and multidisciplinary intervention that can address broader politics and regional anxieties (cf. Büscher & Fletcher, 2019; Glikman et al., 2019; Madden & McQuinn, 2014).

6 TOWARD CONVIVIAL CONSERVATION

Despite polarization surrounding wolves and livestock grazing in the American West, the Wood River Wolf Project has had demonstrable success for over a decade. Amid the challenges of both deterrence and
collaboration, the Project has evolved from coexistence testing ground, to demonstration site for novel tools and best practices, to globally-known effort at adaptive governance and conflict transformation. It has contributed to mounting evidence for the functional effectiveness of nonlethal methods and shown the feasibility of shared space between wolves and livestock.

As wolf recovery pushes these questions to the landscape-scale, co-adaptation and coexistence may exceed the capacities of groups like the WRWP, with broader socio-political questions becoming even more important (Carter & Linnell, 2016; Clark et al., 2005; Nie, 2002, 2003). Promoting landscapes of coexistence, a prospect itself debated among conservation professionals (Lute et al., 2018; Oriol-Cotterill et al., 2015), will require more than technocratic interventions. Convincing ranchers to try—and stick with—nonlethal approaches necessitates engagement with concerns beyond depredation: confronting contrary policy, regional socio-economic pressures, and recognizing the always-social and always-political aspects of environmental conflict (Büscher & Fletcher, 2019; Madden & McQuinn, 2014; Manfredo, Teel, Sullivan, & Dietsch, 2017; Robbins & Moore, 2013).

HWC is widely-regarded as one of the most critical challenges facing conservation today. Between climate and land use change, sharing space with wildlife is set to become an ever more pressing concern. On-the-ground efforts like the WRWP provide important proofs of concept, sites of experimentation, and glimmers of hope. Yet the Project’s experiences also point to challenges of institutionalizing adaptive governance amid a lack of capacity and hostile legal-political contexts. Qualitative research can help us to learn from local efforts while identifying broader challenges, to better engage the political, economic, and cultural aspects of socio-ecological systems, and to design interventions and policies to more effectively encourage transitions toward coexistence.

ACKNOWLEDGMENTS
Research was supported by the UC Berkeley Center for Right Wing Studies, UC Berkeley Social Science Matrix, the Brechin-Chlebowski Endowment Award, and the UC Berkeley Department of Geography. Many, many thanks to the staff and partners of the Wood River Wolf Project, in particular the folks at Lava Lake and the Bean family who welcomed me into their efforts and were patient with this city boy as he learned the ropes. Special thanks to Avery Shawler and Phoebe Bean for their help in putting together the included graphics. Thank you also to my colleagues who workshoped earlier versions of the manuscript, in particular Juliet Lu and Jesse Rodenbiker, and to the two anonymous reviewers who provided such careful reads, valuable suggestions, and encouragement.

CONFLICT OF INTEREST
The authors declare no conflicts of interest.

AUTHOR’ CONTRIBUTIONS
Jeff Vance Martin is sole author of this manuscript. Graphics contributions are noted in text.

DATA AVAILABILITY STATEMENT
Participants in this study did not agree to have their information shared publicly, so much supporting data are not available due to containing information that could compromise the privacy of research participants. Anonymized data and clarifications are available on request from the author, Jeff Vance Martin.

ETHICS STATEMENT
Research referenced herein received approval from the University of California, Berkeley’s Institutional Review Board (Protocol ID: 2016-02-8374). All interviews were conducted with written informed consent.

ORCID
Jeff Vance Martin ⓒ https://orcid.org/0000-0001-5575-2873

ENDNOTES
1 Department of Defense and Full-Year Continuing Appropriations Act 2011 (Public Law 112-10, April 15, 2011).
2 Multiple-Use Sustained-Yield Act of 1960 (MUSYA) (Public Law 86-517).
3 Although making up only a small fraction of overall livestock mortality, wolf losses can be significant for individual producers (Graham, Beckerman, & Thirgood, 2005; Muhly & Musiani, 2009; cf. Steele, Rashford, Foulike, Tanaka, & Taylor, 2013).
4 Part of the United States Department of Agriculture Animal and Plant Health Inspection Service, (USDA APHIS), Wildlife Services is a federal agency with significant variation between state offices.
5 Results from Stone et al. (2017) indicate that the WRWP’s nonlethal methods significantly reduced depredation (sheep were killed 3.5 times higher on average in the neighboring nonprotected area), reduced the need for lethal control of problem wolves, and helped convince herders and operators of the effectiveness of nonlethal deterrents. In its first 7 years, documented losses in the Project Area were kept to less than 1% of stocking numbers—90% lower than reported losses in the rest of the state—with lethal control kept to zero. (The authors also highlight limitations of these inferences and the need for further research.)
6 The functional effectiveness and ecological mechanisms by which these strategies work has been covered in depth elsewhere (see Stone et al., 2017; Wilkinson et al., in press; cf. Treves et al., 2016).
7 Others have noted similar synergies between nonlethal management and sustainable grazing, including with range riders and cattle (Barnes, 2015).
Researchers and ranchers have noted that while Great Pyrenees and Akbash are effective for coyotes, they are not ideal for confronting wolves, who as pack hunters tend to outnumber the guard dogs. Identification and import of more appropriate breeds are ongoing (Kinka & Young, 2019; Ridler, 2018).

See https://www.woodriverwolfproject.org/outreach for documentation of these efforts.

Cost differentials between lethal and nonlethal techniques are difficult to calculate in part due to a lack of full-cost accounting.

The United States District Court for the District of Idaho. Western Watersheds Project vs. Sawtooth National Forest, Bill Levere, Sawtooth National Forest Supervisor, and USFS, Case No. CIV 01-389-E-BlW.

Idaho Legislative Wolf Oversight Committee. 2002. “Idaho Wolf Conservation and Management Plan.” https://idfg.idaho.gov/oldweb/docs/wolves/plan02.pdf.

Some WRWP staff do express skepticism around the value and appropriateness of livestock on public lands, but as Stone noted, “wolves should not have to pay the price for that conflict.”

Resolution 14-022. 2014. “A resolution of the city council of Ketchum, Blaine County, Idaho supporting the values of wildlife coexistence and recognizing the Wood River Wolf Project.” Passed and approved September 15, 2014. Signed Nina Jonas, Mayor. http://ketchumidaho.org/documentcenter/view/2251.

The author (JVM) contributed to the drafting of this statement in collaboration with the WRWP.

REFERENCES

Adams, W. M. (2007). Thinking like a human: Social science and the two cultures problem. Oryx, 41(3), 275–276. https://doi.org/10.1017/S0030605307004131

Armitage, D. R., Plummer, R., Berkes, F., Arthur, R. I., Charles, A. T., Davidson-Hunt, I. J., ... Wollenberg, E. K. (2009). Adaptive co-management for social-ecological complexity. Frontiers in Ecology and the Environment, 7(2), 95–102. https://doi.org/10.1890/070089

Ausband, D. E. (2016). Gray wolf harvest in Idaho. Wildlife Society Bulletin, 40(3), 500–505. https://doi.org/10.1111/wsb.12670

Associated Press. (2002, December 21). Wolf: Endangered or ‘wildlife terrorist’? USA Today. Retrieved from http://usatoday30.usatoday.com/news/nation/2002-12-21-wolves-feature_x.htm

Ausband, D. E., Rich, L. N., Glenn, E. M., Mitchell, M. S., Zager, P., Miller, D. A. W., ... Mack, C. M. (2014). Monitoring gray wolf populations using multiple survey methods. The Journal of Wildlife Management, 78(2), 335–346. https://doi.org/10.1002/jwmg.654

Baca, A. (2019). An old tool protecting new calves. Western Landowners Alliance, December 23, 2019. https://westernlandowners.org/an-old-tool-protecting-new-calves/

Baden, J., & Snow, D. (1997). The next west: Public lands, community, and economy in the American West. Washington, DC: Island Press.

Bangs, E. E., & Fritts, S. H. (1996). Reintroducing the Gray Wolf to Central Idaho and Yellowstone National Park. Wildlife Society Bulletin, 24(3), 402–413 http://www.jstor.org.libproxy.berkeley.edu/stable/3783320

Barnes, M. 2015. Livestock management for coexistence with large carnivores, healthy land and productive ranches. White paper. People and Carnivores (Formerly Keystone Conservation). https://peopleandcarnivores.org/wp/wp-content/uploads/2017/03/PC_2015_WhitePaper.pdf.

Berger, K. M. (2006). Carnivore-livestock conflicts: Effects of subsidized predator control and economic correlates on the sheep industry. Conservation Biology, 20(3), 751–761. https://doi.org/10.1111/j.1523-1739.2006.00336.x

Brick, P. D., & Cawley, R. M. (1996). A wolf in the garden: The land rights movement and the new environmental debate. Lanham, MD: Rowman & Littlefield.

Bruskotter, J. T., & Shelby, L. B. (2010). Human dimensions of large carnivore conservation and management: Introduction to the special issue. Human Dimensions of Wildlife, 15, 311–314. https://doi.org/10.1080/10871209.2010.508068

Bruskotter, J. T., & Wilson, R. S. (2014). Determining where the wild things will be: Using psychological theory to find tolerance for large carnivores. Conservation Letters, 7(3), 158–165. https://doi.org/10.1111/conl.12072

Blücher, B., & Fletcher, R. (2019). Towards convivial conservation. Conservation and Society, 17(3), 283–296. https://doi.org/10.4103/cs.cs_19_75

Carter, N. H., Bruskotter, J. T., Vucetich, J., Crabtree, R., Jaicks, H., Karns, G., ... Linnell, J. D. C. (2019). Towards human-wildlife coexistence through the integration of human and natural systems: The case of Grey Wolves in the Rocky Mountains, USA. In B. Frank, J. A. Glikman, & S. Marchini (Eds.), Human-Wildlife Interactions: Turning conflict into coexistence (pp. 384–413). Cambridge, England: Cambridge University Press.

Carter, N. H., & Linnell, J. D. C. (2016). Co-adaptation is key to coexisting with large carnivores. Trends in Ecology & Evolution, 31(8), 575–578. https://doi.org/10.1016/j.tree.2016.05.006

Carter, N. H., Riley, S. J., & Liu, J. (2012). Monitoring gray wolf populations using multiple survey methods. The Journal of Wildlife Management, 76(3), 535–551. https://doi.org/10.1111/j.1523-1739.2011.01442.x

Chaffin, B. C., Gosnell, H., & Cosens, B. A. (2014). A decade of monitoring gray wolves in Idaho. Wolf: Endangered or ‘wildlife terrorist’? USA Today. Retrieved from http://usatoday30.usatoday.com/news/nation/2002-12-21-wolves-feature_x.htm

Charnley, S., Sheridan, T. E., & Nabhan, G. P. (Eds.). (2014). Stitching the West back together: Conservation of working landscapes. Chicago, Illinois: University of Chicago Press.

Clark, T., Rutherford, M., & Casey, D. (Eds.). (2005). Coexisting with large carnivores: Lessons from greater Yellowstone. Washington, DC: Island Press.

Coleman, J. T. (2009). Vicious: Wolves and men in America. New Haven, CT: Yale University Press.

Cronon, W. (Ed.). (1996). Uncommon ground: Rethinking the human place in nature. New York, NY: W. W. Norton & Company.

Defenders of Wildlife. (2010, August 20). Defenders shifts focus to wolf coexistence partnerships. Retrieved from https://defenders.org/newsroom/defenders-shifts-focus-wolf-coexistence-partnerships.

Defenders of Wildlife. (2014, March 27). ‘Wolf Control Board’ signed into law: Green lights unsustainable wolf killing in Idaho. Retrieved from https://defenders.org/newsroom/wolf-control-board-signed-law-green-lights-unsustainable-wolf-killing-idaho.
DeFries, R., & Nagendra, H. (2017). Ecosystem management as a wicked problem. Science, 356(6335), 265–270. https://doi.org/10.1126/science.aal1950
Dickman, A. J. (2010). Complexities of conflict: The importance of considering social factors for effectively resolving human-Wildlife conflict. Animal Conservation, 13(5), 458–466. https://doi.org/10.1111/j.1469-1795.2010.00368.x
Drury, R., Homewood, K., & Randal, S. (2011). Less is more: The potential of qualitative approaches in conservation research. Animal Conservation, 14(1), 18–24. https://doi.org/10.1111/j.1469-1795.2010.00375.x
Dutcher, J., Dutcher, J., & Manfull, J. (2013). The hidden life of wolves. Washington, DC: National Geographic Books.
Fascione, N., Delach, A., & Smith, M. E. (Eds.). (2004). People and predators: From conflict to coexistence. Washington, DC: Island Press.
Few, A. P., Sherry, J. A., Talmo, R., Steuber, J. E., & Baca, A. (2019). Holding space: In Montana, unlikely allies find common ground. The Wildlife Professional, 13(3), 32–36. https://www.nnrdc.org/sites/default/files/media-uploads/holding-space_4.pdf
Fischer, H. (1995). Wolf wars: The remarkable inside story of the restoration of wolves to Yellowstone. Helena, MT: Falcon Press.
Frank, B., Glikman, J. A., & Marchini, S. (Eds.). (2019). Human-Wildlife interactions: Turning conflict into coexistence. Cambridge, England: Cambridge University Press.
Frank, B., & Glikman, J. A. (2019). Human-Wildlife conflicts and the need to include coexistence. In B. Frank, J. A. Glikman, & S. Marchini (Eds.), Human-Wildlife interactions: Turning conflict into coexistence (pp. 1–19). Cambridge, England: Cambridge University Press.
Glikman, J. A., Frank, B., & Marchini, S. (2019). Human-Wildlife interactions: Multifaceted approaches for turning conflict into coexistence. In B. Frank, J. A. Glikman, & S. Marchini (Eds.), Human-Wildlife interactions: Turning conflict into coexistence (pp. 439–452). Cambridge, England: Cambridge University Press.
Graham, K., Beckerman, A. P., & Thirgood, S. (2005). Human-predator-prey conflicts: Ecological correlates, prey losses and patterns of movement. Biological Conservation, 122(2), 159–171. https://doi.org/10.1016/j.biocon.2004.06.006
Green, R. E., Cornell, S. J., Scharlemann, J. P. W., & Balmford, A. (2005). Farming and the Fate of Wild Nature. Science, 307 (5709), 550–555. https://doi.org/10.1126/science.1106049
Haswell, P. M., Kusak, J., & Hayward, M. W. (2017). Large carnivore impacts are context-dependent. Food Webs, 12(C), 1–11 https://doi.org/10.1080/1938827X.2016.1021233
Hays, S. P. (2017). Conservation and the gospel of efficiency: The progressive conservation movement, 1890–1920. New York, NY: Atheneum Press.
Hines, J. D. (2010). Rural gentrification as permanent tourism: The creation of the ‘new’ west archipelago as postindustrial cultural space. Environment and Planning D: Society and Space, 28(3), 509–525. https://doi.org/10.1068/d3309
Holling, C. S. (1978). Adaptive environmental assessment and management. Chichester, England: John Wiley & Sons http://pure.iiasa.ac.at/id/eprint/823/
Hutton, J. M., & Leader-Williams, N. (2003). Sustainable use and incentive-driven conservation: Realigning human and conservation interests. Oryx, 37(2), 215–226. https://doi.org/10.1017/S0030605303000395
Iliopoulos, Y., Astaras, C., Lazarou, Y., Petridou, M., Kazantzidis, S., & Waltert, M. (2019). Tools for co-existence: Fladry corrals efficiently repel wild wolves (Canis lupus) from experimental baiting sites. Wildlife Research, 46, 484. https://doi.org/10.1071/WR18146
Keim, B. (2017, April 5). A peaceful end to the wolf wars? Anthropocene. Retrieved from http://www.anthropocenemagazine.org/2017/04/wood-river-wolf-project/
Kinka, D., & Young, J. K. (2019). Evaluating domestic sheep survival with different breeds of livestock Guardian dogs. RangeLand Ecology & Management, August, 72, 923–932. https://doi.org/10.1016/j.rama.2019.07.002
Kremen, C., & Merenlender, A. M. (2018). Landscapes that work for biodiversity and people. Science, 362(6412), eaau6020. https://doi.org/10.1126/science.aau6020
Lennox, R. J., Gallagher, A. J., Ritchie, E. G., & Cooke, S. J. (2018). Evaluating the efficacy of predator removal in a conflict-prone world. Biological Conservation, 224(August), 277–289. https://doi.org/10.1016/j.biocon.2018.05.003
Levy, K. (2013, August 25). Wolves blamed for deaths of 176 sheep: Nearly all died by suffocation. Idaho State Journal. Retrieved from https://www.idahostatejournal.com/members/wolves-blamed-for-deaths-of-sheep-nearly-all-died-by/article_53921d66-0d54-11e3-bcd4-001a4bc887a.html.
Linnell, J. D. C., & Kaltenborn, B. P. (2019). Institutions for achieving human-wildlife coexistence: The case of large herbivores and large carnivores in Europe. In B. Frank, J. A. Glikman, & S. Marchini (Eds.), Human-wildlife interactions: Turning conflict into coexistence (pp. 288–310). Cambridge, England: Cambridge University Press.
Linnell, J. D. C., Swenson, J. E., & Anderson, R. (2001). Predators and people: Conservation of large carnivores is possible at high human densities if management policy is Favourable. Animal Conservation, 4(4), 345–349. https://doi.org/10.1017/S1367943001001408
Lorimer, J. (2015). Wildlife in the Anthropocene: Conservation after nature. Minneapolis, MN: University of Minnesota Press.
Lute, M. L., Carter, N. H., López-Bao, J. V., & Linnell, J. D. C. (2018). Conservation professionals agree on challenges to coexisting with large carnivores but not on solutions. Biological Conservation, 218(February), 223–232. https://doi.org/10.1016/j.biocon.2017.12.035
Macdonald, C., Gallagher, A. J., Barnett, A., Brunnschweiler, J., Shiffman, D. S., & Hammerschlag, N. (2017). Conservation potential of apex predator tourism. Biological Conservation, 215, 132–141. https://doi.org/10.1016/j.biocon.2017.07.013
Madden, F., & McQuinn, B. (2014). Conservation’s blind spot: The case for conflict transformation in Wildlife conservation. Biological Conservation, 178(October), 97–106. https://doi.org/10.1016/j.biocon.2014.07.015
Malcolm, J., Schwartz, M. W., Evansen, M., Ripple, W. J., Polasky, S., Gerber, L. R., ... Miller, J. R. B. (2019). Solve the biodiversity crisis with funding. Science, 365(6459), 1256. https://doi.org/10.1126/science.aay9839
Manfredo, M. J., Bruskotter, J. T., Teel, T. L., Fulton, D., Schwartz, S. H., Arlinghaus, R., ... Sullivan, L. (2016). Why social values cannot be changed for the sake of conservation.
Rittel, H. W. J., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy Sciences, 4*(2), 155–169. https://doi.org/10.1007/BF01045730

Robbins, P., Meehan, K., Gosnell, H., & Gilbertz, S. J. (2009). Writing the new west: A critical review. *Rural Sociology, 74*(3), 356–382. https://doi.org/10.1526/003601109798037240

Robbins, P., & Moore, S. A. (2013). Ecological anxiety disorder: Diagnosing the politics of the Anthropocene. *Cultural Geographies, 20*(1), 3–19. https://doi.org/10.1177/1474474012469887

Rowley, W. D. (1985). *U.S. Forest Service grazing and rangelands: A history.* College Station, TX: Texas A&M University Press.

Rosenzweig, M. L. (2003). *Win-win ecology: How the Earth’s species can survive in the midst of human enterprise.* Oxford, England: Oxford University Press.

Sayre, N. (2004). Viewpoint: The need for qualitative research to understand ranch management. *Journal of Range Management, 57*(6), 668–674. https://doi.org/10.2111/1551-5028(2004)057[0668:VTNFQR]2.0.CO;2

Schreiber, E. S. G., Bearlin, A. R., Nicol, S. J., & Todd, C. R. (2004). Adaptive management: A synthesis of current understanding and effective application. *Ecological Management & Restoration, 5*(3), 177–182. https://doi.org/10.1111/j.1442-8903.2004.00206.x

Schusler, T. M., Decker, D. J., & Pfeffer, M. J. (2003). Social learning for collaborative natural resource management. *Society & Natural Resources, 16*(4), 309–326. https://doi.org/10.1080/08941920390178874

Slagle, K., Bruskotter, J. T., Singh, A. S., & Schmidt, R. H. (2017). Attitudes toward predator control in the United States: 1995 and 2014. *Journal of Mammalogy, 98*(1), 7–16. https://doi.org/10.1093/jmammal/gyw144

Smith, A. H., & Martin, W. E. (1972). Socioeconomic behavior of cattle ranchers, with implications for rural community development in the west. *American Journal of Agricultural Economics, 54*(2), 217–225. https://doi.org/10.2307/1238704

Steene, J. R., Rashford, B. S., Foulke, T. K., Tanaka, J. A., & Taylor, D. T. (2013). Wolf (*Canis lupus*) predation impacts on livestock production: Direct effects, indirect effects, and implications for compensation ratios. *Rangeland Ecology & Management, 66*(5), 539–544. https://doi.org/10.2111/REM-D-13-0031.1

Sterling, E. J., Betley, E., Sigouin, A., Gomez, A., Toomey, A., Cullman, G., ... Porzecanski, A. L. (2017). Assessing the evidence for stakeholder engagement in biodiversity conservation. *Biological Conservation, 209*, 159–171. https://doi.org/10.1016/j.biocon.2017.02.008

Steven, M. S. (2014). *Lava Lake Land & Livestock: The role of private landowners in landscape-scale conservation.* In S. Charnley, T. E. Sheridan, and G. P. Nahban (Eds.), *Stitching the West Back Together: Conservation of working landscapes* (pp. 185–201). Chicago, IL: University of Chicago Press.

Stone, S. A. (2014, June 18). Saving wolves in Idaho: Coexistence with wolves gains ground in Idaho. *Defenders of Wildlife (Blog).* Retrieved from https://defenders.org/blog/2014/06/saving-wolves-idaho.

Stone, S. A., Breck, S. W., Timberlake, J., Haswell, P. M., Najera, F., Bean, B. S., & Thornhill, D. J. (2017). Adaptive use of nonlethal strategies for minimizing wolf–sheep conflict in Idaho. *Journal of Mammalogy, 98*(1), 33–44. https://doi.org/10.1093/jmammal/gyw188

Strong, Z. (2019, December 26). Congress funds new nonlethal conflict-prevention positions. *NRDC.org.* Retrieved from https://www.nrdc.org/experts/zack-strong/congress-funds-new-nonlethal-conflict-prevention-positions.

Treves, A., & Bruskotter, J. (2014). Tolerance for predatory Wildlife. *Science, 344*(6183), 476–477. https://doi.org/10.1126/science.1252690

Treves, A., & Karanth, K. U. (2003). Human-carnivore conflict and perspectives on carnivore management worldwide. *Conservation Biology, 17*(6), 1491–1499. https://doi.org/10.1111/j.1523-1739.2003.00059.x

Treves, A., Wallace, R. B., Naughton-Treves, L., & Morales, A. (2006). Co-managing human-Wildlife conflicts: A review. *Human Dimensions of Wildlife, 11*(6), 383–396. https://doi.org/10.1080/10871200600984265

Treves, A., Krofel, M., & Mcmanus, J. (2016). Predator control should not be a shot in the dark. *Frontiers in Ecology and the Environment, 14*(September), 380–388. https://doi.org/10.1002/fee.1312

United States Forest Service. (2012). *Land areas of the National Forest System.* FS-383. Washington, DC: USDA Forest Service. Retrieved from https://www.fs.fed.us/land/staff/lar/LAR2011_LAR2011_Book_A5.pdf

United States Forest Service. (n.d.). Frank Church river of no return wilderness. Special places. Retrieved from https://www.fs.usda.gov/detail/scnt/specialplaces/?cid=stelprdb5360033.

USDA Wildlife Services. (2015, June 5). WS vision, mission and goals. *USDA APHIS.* Retrieved from https://www.aphis.usda.gov/aphis/ourfocus/wildlifedamage/sa_program_overview/ct_aboutmission.

van Eeden, L. M., Eklund, A., Miller, J. R. B., López-Bao, J. V., Chapron, G., Cejtin, M. R., ... Treves, A. (2018). Carnivore conservation needs evidence-based livestock protection. *PLoS Biology, 16*(9), e2005577. https://doi.org/10.1371/journal.pbio.2005577

van Eeden, L. M., Dickman, C. R., Ritchie, E. G., & Newsome, T. M. (2017). Shifting public values and what they mean for increasing democracy in Wildlife management decisions. *Biodiversity and Conservation, 26*(11), 2759–2763. https://doi.org/10.1007/s10531-017-1378-9

Walker, P., & Fortmann, L. (2003). Whose landscape? A political ecology of the ‘exurban’ sierra. *Cultural Geographies, 10*(4), 469–491. https://doi.org/10.1119/1474474003eu285oa

Walters, C. J. (1986). *Adaptive management of renewable resources.* Basingstoke, England: Macmillan.

Western, G., Macdonald, D. W., Loveridge, A. J., & Dickman, A. J. (2019). Creating landscapes of coexistence: Do conservation interventions promote tolerance of lions in human-dominated landscapes? *Conservation and Society, 17*(2), 204–217. https://doi.org/10.4103/cs.cs_18_29

Wilkinson, C. F. (1992). *Crossing the next Meridian: Land, water, and the future of the west.* Washington, DC: Island Press.

Wilkinson, C., McInturff, A., Miller, J., Yovovich, V., Gaynor, K., Calhoun, K., ... Brashares, J. (in press). An ecological framework for contextualizing carnivore-livestock conflict. *Conservation Biology.*

Woodroffe, R., Thirgood, S., & Rabinowitz, A. (Eds.). (2005). *People and wildlife: Conflict or coexistence.* Cambridge, England: Cambridge University Press.
Wuerthner, G. (2017, October 19). Coexistence between wolves and livestock is a delusion. High Country News. Retrieved from https://www.hcn.org/articles/opinion-coexistence-between-wolves-and-livestock-is-a-delusion.

Wuerthner, G., & Matteson, M. Y. (2002). Welfare ranching: The subsidized destruction of the American West. Washington, DC: Island Press.

Wutz, K. (2011, August 12). Nonlethal wolf deterrents touted, questioned. Idaho Mountain Express. Retrieved from http://archives.mtexpress.com/index2.php?ID=2005138028#.Xlz86ZhKlUk

Young, J. K., Ma, Z., Laudati, A., & Berger, J. (2015). Human-carnivore interactions: Lessons learned from communities in the American west. Human Dimensions of Wildlife, 20(4), 349–366. https://doi.org/10.1080/10871209.2015.1016388

Young, J. K., Draper, J., & Breck, S. (2019). Mind the gap: Experimental tests to improve efficacy of Fladry for nonlethal Management of Coyotes. Wildlife Society Bulletin, 43(2), 265–271. https://doi.org/10.1002/wsb.970

Young, J. C., Jordan, A., Searle, K. R., Butler, A., Simmons, P., & Watt, A. D. (2013). Framing scale in participatory biodiversity management may contribute to more sustainable solutions. Conservation Letters, 6(5), 333–340. https://doi.org/10.1111/conl.12012

How to cite this article: Martin JV. Peace in the valley? Qualitative insights on collaborative coexistence from the Wood River Wolf Project. Conservation Science and Practice. 2021;3:e197. https://doi.org/10.1111/csp2.197