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Article

# California Condors, Source Credibility, and Wildlife Conservation Messaging

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**Abstract:** This article examines the role of source credibility in the sphere of wildlife conservation campaigns. Specifically, it explores how particular messengers can motivate hunters, ranchers, and wildlife managers in California, Utah, and Arizona to voluntarily adopt non-lead ammunition. I analyze two partner websites, each designed to provide the hunting community with accurate information about non-lead ammunition. I then identify key principles regarding source credibility that arose from semi-structured interviews with four individuals closely involved in North American vulture and raptor conservation: representatives of the Ventana Wildlife Society, the Institute for Wildlife Studies, The Peregrine Fund, and Pinnacles National Park. The conclusion identifies lessons about the role of source credibility in wildlife conservation campaigns and situates the findings in the context of existing research on environmental communication and education.

**Keywords:** environmental communication; education; source credibility; wildlife conservation; condors; vultures; raptors; non-lead ammunition



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## 1. Introduction

Across the globe, vulture populations are in decline (Ottinger et al. 2021). In the southwest of the United States, the California condor, an iconic species with a wingspan of close to 10 feet, has faced decades of population pressures due to a combination of habitat destruction, poaching, and lead poisoning (Simon and Axelrod 2019, para. 5). At the time of European settlement, condors ranged from (modern-day) British Columbia to Baja California, Mexico. This range shrank as settlers moved west until, in the early 1980s, fewer than two dozen condors were left in the world.<sup>1</sup> Conservationists captured these remaining birds and began to breed them (along with the existing captive flock)<sup>2</sup>—from April 1987 to January 1992, condors were extinct in the wild.<sup>3</sup> Since 1992, captive-bred condors have been released at five primary sites in western North America (Pinnacles National Park, Big Sur, Hopper Mountain Wildlife Refuge Complex, Vermillion Cliffs, and Baja California). Thanks, in part, to this breeding program, there are now more than 300 California condors in the wild (with an additional approximately 200 in captivity). As of May 2022, condors will soon be reintroduced to Northern California.<sup>4</sup>

Yet despite this relative success, serious threats remain to the species. Condors are still dying due to wildfires, electrocution from power lines, microtrash consumption, collisions with cars, and rodenticide poisoning.<sup>5</sup> The primary cause of death is lead residue from ammunition (lead shot, rifle bullet fragments, and sometimes intact projectiles)<sup>6</sup> which has killed at least 76 condors in the last 25 years.<sup>7</sup> Upon entering a target animal (e.g., deer or elk), lead-based rifle bullets sometimes fragment into hundreds of tiny pieces—these pieces can be subsequently ingested by condors and other wildlife when they scavenge on the remains left behind by hunters, poachers, ranchers, and wildlife managers. Put simply, hunters, ranchers, and wildlife managers rarely intend to harm scavenging vultures and raptors. Rather, their choice of ammunition can inadvertently cause the death of such animals.

This article emphasizes the importance of source credibility in efforts to motivate hunters, ranchers, and wildlife managers in California, Utah, and Arizona to switch from lead to non-lead ammunition. As outlined below, multiple pathways are required to achieve this shift—far more than a simple legislative ban. I first provide context regarding the threats posed by lead ammunition. Second, I offer an overview of the scholarly literature on environmental messaging and source credibility. Third, I analyze two partner websites, <http://nonleadpartnership.org> (accessed on 1 January 2022) and <http://huntingwithnonlead.org> (accessed on 1 January 2022),<sup>8</sup> designed to inform the hunting community about the benefits and logistics of switching to non-lead ammunition, and then identify core messaging principles that arose from semi-structured telephone interviews with four individuals at the forefront of North American vulture and raptor<sup>9</sup> conservation: Kelly Sorenson (Executive Director of the Ventana Wildlife Society), Chad Thomas (Wildlife Biologist and Non-Lead Outreach Coordinator in California for the Institute for Wildlife Studies), Chris Parish (Chief Executive Officer of The Peregrine Fund, and co-founder of the North American Non-Lead Partnership), and Daniel Ryan (Invasive-Wildlife Biologist and Non-Lead Ammunition Specialist at Pinnacles National Park).<sup>10</sup> By no means are these four organizations the only ones working to restore condor populations. Nonetheless, each has a long history of involvement with, and continuing commitment to, this endeavor. Taken together, they offer important insights into current conservation strategies and the role of source credibility therein. The conclusion identifies key lessons derived from the interviews, and situates the findings in the context of existing research on environmental communication and education.

## 2. Lead Ammunition

In 1991, the U.S. federal government banned the use of lead shot for waterfowl hunting,<sup>11</sup> however, there is currently no blanket ban of other lead-based bullets used for hunting. Advocates have long emphasized the serious threats that lead fragments pose to human and wildlife health,<sup>12</sup> and noted that lead is banned in other products such as paint, gasoline, and plumbing.<sup>13</sup> The hazards posed by lead in all forms is clear. As argued by scholars Noel and Helen Snyder “We know of no persuasive reasons why lead, in all its forms that can contaminate humans, should remain any more socially acceptable than asbestos” (p. 231). In 2013, leading scientists from across North America issued a consensus statement on the health risks posed by lead ammunition. The statement asserts that “lead-based ammunition fragments pose a serious and significant threat to California wildlife” and specifies that “lead poisoning in condors is preventing their successful recovery in the wild”.<sup>14</sup>

After an intense public campaign, in 2013, California became the first state to introduce a general state-wide ban on the use of lead ammunition throughout its territory.<sup>15</sup> Bill AB-711,<sup>16</sup> a law that took full effect in mid-2019.<sup>17</sup> Some have argued that the only way to achieve a substantial reduction of lead in the natural environment is to enforce a nationwide ban. For instance, Snyder and Snyder claim that “even with appropriate education efforts, leaving the use of nontoxic or lead ammunitions a voluntary choice provides only modest hopes of achieving an adequately effective solution” (p. 233).

Applying to the entire state (the most populous in the U.S.), California’s lead ban is a significant piece of legislation. Yet despite the broad scale of the new law, lead ammunition remains a continued threat for condors (and other vultures and raptors including turkey vultures, ravens, golden eagles, and bald eagles). As noted above, reintroduced condors also live and reproduce in Arizona and Utah, states that have implemented voluntary non-lead ammunition programs that supply hunters with alternative bullets if they hunt in condor territory, or encourage the removal of lead-tainted animal remains from the field.<sup>18</sup>

Even within California, it is difficult (near impossible) to enforce a lead ammunition ban.<sup>19</sup> There is a long history of lead ammunition use within the hunting community, non-lead options are generally more expensive, and there are frequent limits to availability. In

addition, there are few law enforcement officers, and condor terrain (including on massive private ranches) is expansive. Hinting at the limits of a regulatory approach, Snyder and Snyder note that “a substantial fraction . . . of deer shot in California are poached rather than legal kills”, a pattern that suggests some hunters’ willingness to ignore certain elements of state law (p. 232).<sup>20</sup> This said, the vast majority of hunters have no interest in harming condors or other scavengers—if they use lead ammunition, it is not with the intent of killing these animals. This raises a crucial question. If a state-based regulatory ban alone is insufficient to remove lead from the natural environment, how can conservation organizations successfully encourage western hunters, ranchers, and wildlife managers to voluntarily make the shift to non-lead ammunition?

To answer this question, I spoke with four of North America’s leading experts in the area of vulture and raptor conservation. A core theme gradually came into focus: the importance of source credibility in efforts to build and sustain relationships with local stakeholders. Before proceeding, I offer a theoretical background on the scholarship of environmental messaging and source credibility.

### 3. Environmental Messaging and Source Credibility

The literature on environmental messaging arises from a diverse set of fields including environmental communication, journalism and media studies, social psychology, science and risk communication, sustainability studies, environmental education, and environmental management.

Scholars have approached the topic through a variety of frameworks: for instance, the role of voice in environmental communication (Peoples and Depoe 2014), and the intersection of media, communication, and the environment (Hansen 2018; Lester 2010). A common theme is the importance of adapting messages to target audiences. Curti and Valdez (2009) have studied The Peregrine Fund’s education program associated with efforts to restore harpy eagle populations in Panama. They assert that it is crucial to “identify and prioritize the target audience” (p. 13), and to “offer accurate information that is relevant to the audience’s lives and culture” (p. 14). The authors suggest that environmental education initiatives should, therefore, first understand audience attitudes and needs (p. 13). As stated by political scientist Benhabib (1996), “the process of *articulating good reasons in public* forces [an] individual to think of what would count as a good reason for all others involved” (pp. 71–72). In other words, a compelling message adapts to a specific audience—and this requires a messenger to first understand that audience.

This focus on pre-existing audience beliefs and attitudes aligns with Ross-Winslow and Teel’s (2011) assertion that efforts to decrease the environmental impact of lead ammunition require familiarity with “the arguments, attitudes, and beliefs of all stakeholders” (p. 36). Noting that the 1991 U.S. nationwide ban on the use of lead shot for waterfowl hunting “was implemented without much regard for hunters’ attitudes toward the regulation”, the authors state that the law “was subsequently met with much resistance and animosity, thereby diminishing its effectiveness” (p. 39).

Environmental messaging is clearly strengthened when it empowers individuals to see themselves as stakeholders in conservation efforts (Curti and Valdez 2009; Peake et al. 2009; Ross-Winslow and Teel 2011). As one example, a public awareness campaign successfully transformed villagers’ attitudes towards local crocodiles in San Mariano, Philippines. Rather than seeing the crocodiles as threats, the villagers were successfully encouraged to take pride in their conservation (van der Ploeg et al. 2011). In another case, conservation groups worked to establish positive relationships with local communities in order to support the re-introduction of chimpanzees, gorillas, and bonobos in the Democratic Republic of Congo (Cartwright et al. 2012, pp. 255–56). The authors caution that “a lack of communication and community support can contribute to long-term weakness or failure of a [conservation] project” (p. 252). In the context of non-lead ammunition education in the U.S., effective messaging might thus accentuate that “agencies are not blaming hunters, but rather asking for their help” as valued partners (Schweizer et al. 2009, p. 67).<sup>21</sup>

In addition to message style and content, its origins and source are also consequential. It is worth differentiating between evidence-based or “intrinsic” credibility, and source or “extrinsic” credibility. There are of course overlaps, however, the literature clearly suggests that the messenger/source can play a powerful role in determining how (and whether) an audience approaches and interprets a given message. Credibility can be defined as the assessment of a messenger’s intentions, competence, expertise, and trustworthiness (Hollihan and Baaske 2015, p. 129; Hovland et al. 1953). Larson (2010) expanded this list to also include dynamism, charisma, and image (pp. 247–49). The importance of perceived intentions aligns with Burke’s suggestion that successful rhetoric generally identifies shared aims that resonate with an audience’s experiences and values (Burke 1969, p. 55).<sup>22</sup> Existing research nicely demonstrates that credibility is not a static entity. Rather, it is multidimensional and relational—it emerges through audience perceptions of expertise, goodwill, and trustworthiness (Horton et al. 2015, pp. 30, 23). Highlighting the relational basis of communication, Lester and Foxwell-Norton (2020) thus propose that “public understandings of science cannot be divorced from . . . social processes” (p. 271).

Research in the field of health communication has indicated how the perceived credibility of an information source can influence the interpretation of public health messages (Haase et al. 2015, p. 920; Hample and Hample 2014). Belanger and Szmania (2018) have explored the role of source credibility in the sphere of counter-extremism. In an analysis of efforts to promote voluntary non-lead programs in the U.S., Schulz et al. (2021) note that outreach programs “can be ineffective because simply sharing information rarely affects human behavior” (p. 56). Acknowledging that policy aims regarding the reduction of lead hunting ammunition are complicated by “the broader social issues related to firearms and ammunition regulations” (p. 56),<sup>23</sup> they nonetheless signal out as promising programs that use hunters as key messengers—individuals that are both “change agents and also trusted opinion leaders” with an important “ability to communicate with hunters” (p. 4).

This recommendation points to the persuasive impact of source credibility—the role played by the messenger as opposed to (or in addition to) the message itself. Indeed, in the sphere of environmental conservation, effective communication often requires an understanding of “how credible a source is to recipients” as well as “the perceived intent of the source” (Ross-Winslow and Teel 2011, p. 40). This is particularly true with respect to the phenomenon of confirmation bias—the tendency for people to accept information that is consistent with existing beliefs and attitudes, and dismiss information that contradicts these beliefs and attitudes (Schweizer et al. 2009, p. 44).<sup>24</sup> For instance, assessing efforts to create public support for crocodile conservation in the Philippines, van der Ploeg et al. (2011) note that “[locals’] views are often more trusted than the opinion of outside conservationists” (p. 321).

Neighbor-to-neighbor and/or peer-to-peer communication is often powerful with respect to extrinsic credibility. Nonetheless, there can be ways for “outsiders” to bolster their perceived credibility with key audiences. For instance, Schaefer and Beier (2013) suggest that scientists can develop credibility with wildlife managers by engaging in public service, clearly stating their biases and opinions, striving to find common ground among them, and listening to and respecting the ideas, values, and concerns of non-experts (pp. 4, 6). In addition, the authors suggest the importance of honestly acknowledging situations in which proposals may adversely affect hunters’ interests (p. 7). As an example of the benefits of such a collaborative approach to engaging the hunting community, the authors note that “the transition away from [lead-based ammunition] within the Arizona range of California condors . . . has occurred through sustained dialogue with sportsmen, with levels of voluntary compliance reaching over 90% over the last [decade]”. They conclude that “a top-down edict may have been enacted more quickly, but without achieving the same level of acceptance and compliance” (p. 7).

Taken as a whole, the above studies suggest the benefits of a dialogic and invitational approach to engaging hunters, ranchers, and wildlife managers on the issue of non-lead ammunition. In the language of soft power, it is often more effective to engage and persuade



an audience “through attraction rather than coercion or payment” (Nye 2008, p. 94). And crucially, specific messengers—those with shared experiences and the ability to speak an audience’s language—are more likely to attract a receptive audience.

I now turn to contemporary efforts to support the adoption of non-lead ammunition in the western U.S. The following analyzes two partner websites designed to educate hunters about non-lead ammunition, and identifies core principles regarding source credibility that emerged through interviews with four leaders in the sphere of condor conservation.

#### 4. Contemporary Outreach: Strategies and Narrative Patterns

##### 4.1. Ventana Wildlife Society

The Ventana Wildlife Society’s (VWS) origins involve conservation efforts surrounding bald eagles. Following the ban of DDT, between the years of 1986 and 2000, the organization released 70 juvenile bald eagles in Big Sur, CA.<sup>25</sup> The non-profit organization’s recent and current focus is condor recovery. The VWS runs release facilities, and every year releases a group of California condors in Big Sur or San Simeon (central California coast).<sup>26</sup> All condors are equipped with numbered wing tags and transmitters for identification and tracking in the field.<sup>27</sup>

In late 2021, I spoke by telephone with the organization’s Executive Director, Kelly Sorenson. I explained that my research touched on contexts wherein human activities cause unintentional harm to wildlife. I first asked Sorenson for some brief contextual background about the VWS’s condor conservation roots, and then inquired about what strategies the VWS has successfully employed to promote a lead-free natural local environment.

Sorenson first noted the long history and difficulties associated with proving a definitive link between lead ammunition and condor mortality. When asked about his organization’s specific focus, he emphasized that the VWS prioritizes building relationships with key local people, particularly landowners and ranchers on whose (often huge) properties the VWS knows condors scavenge. Although it is obvious in hindsight, I had not anticipated the extent to which the VWS tracks the movements of almost every local condor via GPS transmitters. This allows the organization to identify specific people at risk of creating pathways for condor lead-poisoning, and thereafter, to approach these individuals with information and (crucially) offers of free non-lead ammunition. Indeed, one of the VWS’s central accomplishments is that in 2012, it became the first group in California (second in the U.S. after Arizona Game and Fish) to give away non-lead ammunition. Since then (as of the time of writing), it has given away 10,772 boxes of free non-lead ammunition to hunters and ranchers in the condor range.<sup>28</sup>

With respect to the importance of messaging, Sorenson asserted that it is not helpful to simply blame hunters and ranchers for the use of lead ammunition. He stated that the VWS has elected to (in addition to providing free non-lead ammunition) offer science-based information, and perhaps more importantly, build goodwill and positive relationships with key local stakeholders. Acknowledging the near impossibility of strictly enforcing Bill AB-711, particularly on huge private ranches, Sorenson supported a voluntary, market-based approach to reducing the presence of lead ammunition in the local environment.<sup>29</sup> As for the importance of source/messenger credibility, he asserted that “we need better messengers” and half-joked that it would be ideal if Clint Eastwood (an icon of masculinity and famous resident of Carmel, CA) would become involved in spreading the word about the dangers of lead ammunition. Clearly aware that the VWS’s strengths lie not in its expertise in the world of hunting, but rather in its long and successful history of local raptor and vulture conservation, he affirmed that the organization is committed to building enduring, positive relationships with important local stakeholders.<sup>30</sup> As a brief sidenote, Sorenson referenced a new set of videos that the VWS is creating to promote better public awareness about condor conservation.<sup>31</sup>

As a closing comment, Sorenson raised a theme that became recurrent throughout my conversations with the three condor conservation experts—it is currently difficult

to find suitable 0.22 caliber non-lead ammunition.<sup>32</sup> This ammunition shortage likely makes the VWS's commitment to provide free non-lead ammunition to local ranchers and hunters even more important, and no doubt builds the organization's goodwill with these key constituents.

#### 4.2. *The Institute for Wildlife Studies*

Huntingwithnonlead.org (partner site to the North American Non-lead Partnership) is administered by the Institute for Wildlife Studies (IWS),<sup>33</sup> a not-for-profit organization that has collaborated with the National Park Service since 2004 to lethally cull feral hogs from Pinnacles National Park in San Benito and Monterey counties, California. Staff with both organizations used non-lead ammunition to cull hundreds of hogs, and "based on these real world evaluations of non-lead ammo, [the organization] found it to be extremely accurate and lethal" (para. 2). Clearly stating the organization's mission and approach to conversation, the website states:

We are hunters and wildlife biologists who recognize the common ground between hunting and wildlife conservation. It is our mission to promote the positive contributions of hunting and the use of non-lead ammunition by providing accurate information and resources to hunters and wildlife managers. (para. 1)

Further indicating the group's hunter-focused orientation is the clear and non-accusatory explanation of the dangers posed by lead bullet fragments:

A good hunt is one that takes only one pull of the trigger and drops the animal with a quick, humane kill. The idea of accidentally poisoning other non-target wildlife isn't anyone's intention. But many birds and mammals feed on the gutpiles and carcasses that they find during and after hunting season. In many cases, these animals unknowingly eat lead when the carcasses have been shot with lead ammo.<sup>34</sup>

In late 2021, I spoke by telephone with Chad Thomas, a wildlife biologist with the IWS, and the group's non-lead outreach coordinator in California.<sup>35</sup> After explaining who I was and why I was interested, I asked Thomas three questions: (1) what do you do to support a reduction of lead in the natural environment?, (2) what educational or outreach programs have proven effective in reaching ranchers and hunters?, and (3) are there specific messages that work?

Thomas stated that his core mission is to mitigate death to scavengers (bald eagles, raptors, condors), particularly regarding lead mortality, and affirmed that, despite the existence of Bill AB-711, there is continued use of lead ammunition in California, primarily due to increased costs often associated with non-lead bullets, remaining stockpiles, and frequent supply chain issues. Thomas asserted that one recurrent factor is the widespread misunderstanding of the law. As he put it:

Many folks are surprised to find that shooting lead to take wildlife is illegal for all applications. Many ranchers interpret culling nuisance species such as ground squirrels as land management and not hunting. We even recently explained to a retired game warden/county commissioner that depredation was subject to AB711, much to his surprise.

With respect to the IWS's particular role in the broader context of California condor conservation, Thomas started by emphasizing their work culling invasive hogs at Pinnacles National park. Highlighting the power of approaching a given audience as an insider, he told stories of answering technical questions from local ranchers and hunters regarding the performance and ballistics of lead vs non-lead ammunition—a level of technical expertise that only someone with deep hunting experience would be able to provide.

In his own words, Thomas is a member of the hunting community, a position that affords him both an understanding of that group's shared cultural values, and a correlated ability to speak with credibility regarding the science surrounding lead ammunition. This

last point is important, because Thomas accentuated that there is widespread suspicion within the hunting community regarding governmental motivations, and the scientific research, surrounding the connection between lead ammunition and condor mortality (this point was repeated in my subsequent conversation with Chris Parish).

Emphasizing the importance of invitational and non-adversarial communication with the hunting community, Thomas stated, “you catch more flies with honey than vinegar”, and went farther to highlight the importance of “control[ing] the narrative [about non-lead ammunition] within our community”. In other words, there is apparently quite widespread agreement in the hunting communities of Arizona and Utah that there are benefits to getting out ahead of a possible future ban on lead ammunition (such as that in place in California). This point serves as a nice transition to the final case study, The Peregrine Fund—and specifically its co-founded project, the North American Non-lead Partnership.<sup>36</sup>

#### 4.3. *The Peregrine Fund and North American Non-Lead Partnership*

The North American Non-lead Partnership (NANP) was launched in 2018 as a partnership by the Oregon Zoo, The Peregrine Fund, and the Institute for Wildlife Studies, with the aim of “expand[ing] the coalition of hunters, anglers and other conservationists dedicated to improving ecosystem and wildlife health by choosing non-lead options”.<sup>37</sup>

In November 2021, I spoke with Chris Parish, cofounder of the NANP, and Chief Executive Officer of The Peregrine Fund, a globally-engaged non-profit organization dedicated to conserving birds of prey worldwide.<sup>38</sup> One of the world’s leading experts in raptor and vulture conservation, Parish was animated and clear in outlining his viewpoints on how to successfully advocate for condor recovery efforts, particularly with respect to reducing pathways of lead exposure.

Before talking with Parish, I watched a brief July 2021 interview he gave for CBS News wherein he lays out his position on how to address the problem posed by lead ammunition in the condor habitat. After describing the core problem, “hunters often unintentionally leave behind tiny fragments of lead that strip off bullets”, Parish labels himself a “redneck hunter biologist” and states, “these hunters are my people”. With respect to source credibility, it might be difficult to find a better messenger to the western U.S. hunting and ranching communities. Similar to Thomas from the IWS, Parish has a long history of hunting, and he understands and shares the hunting community’s cultural values. He asserts:

hunters are the only ones that can solve this problem, so by pointing to them and saying you’re doing a bad thing—that’s not going to work. You need to appeal to their conservation ethic and their history of conservation and say, ‘here is yet another opportunity where we as hunters can leave a healthier environment . . . for future generations to enjoy’

One premise in the above is that a regulation such as that of California is essentially impossible to enforce. In Parish’s words, “We have a speed limit, but people break that law too”, and copper ammunition is generally harder to find and sometimes more expensive. Equally important is that it is not what people are used to: “changing tradition is hard. It’s not as simple as ‘here’s the science, here’s the logic, so do the right thing’”. Still more important, Parish claims, is communicating in an open-minded way with hunters without assuming that they are simply “bad actors”. Referencing the frequent mistrust of government regulation, he cautions that “if [hunters] don’t understand it, they might well write it off as a piece of unnecessary legislation that really isn’t a problem”.<sup>39</sup>

The NANP’s express purpose is to “engage hunters and other wildlife enthusiasts [by] designing and promoting voluntary measures to increase the use of non-lead ammunition”.<sup>40</sup> Its formal resolution celebrates the historical relationship between North American “sportsmen and -women” and “natural resource conservation”, and asserts that “there is credible and substantial scientific evidence showing that lead ammunition can cause



unintended impacts on our wildlife resources”,<sup>41</sup> particularly when “scavenging birds and mammals eat the remains of carcasses shot with lead ammunition”.<sup>42</sup>

As such, the partnership “[asks] shooters for a simple, voluntary fix: switch to non-lead ammunition for instances where meat or a gutpile might be left for wild animals to scavenge”.<sup>43</sup> The words *simple* and *voluntary* are powerful attractors, and the NANP takes additional steps to ensure its target audience understands its limited, practical, and apolitical request: “The partnership does not seek to ban lead ammunition, firearms, or hunting. Its singular focus is safeguarding wildlife—an achievable goal with the help of hunters, America’s first conservationists” (ibid).

For the purpose of this paper, the resolution’s most striking claim is the following: “continued research and current efforts indicate that hunters have a very high willingness to take action if asked by a credible peer or group within the sporting community”.<sup>44</sup> This assertion suggests the promise and power of communication arising from an accepted (even respected) insider—someone with extrinsic source/message credibility.

Several things about our telephone conversation struck me. The first was Parish’s emphasis on definitional clarity. When asked about his organization’s number one challenge with respect to supporting wild condors, he immediately identified a lack of available non-lead ammunition (indeed ammunition in general). Several times he referred to the benefits of focusing on “pathways of exposure” to lead poisoning, pathways that generally arise from the shooting practices of hunters, ranchers, and wildlife managers. It struck me that an emphasis on pathways to exposure achieves the goal of not singling out hunters as uncooperative “bad actors”. Parish was also very clear that the term *non-toxic* is a federal definition that may not be broadly appropriate to the conversation (for instance, in some situations and concentrations, copper may be toxic as well). He encouraged use of the term non-lead. As for the commonly referenced statistic that approximately 90% of Arizona hunters have voluntarily participated in the state’s non-lead outreach program, Parish provided some helpful specificity. This statistic refers only to Northern Arizona deer hunters that hunt adjacent to the condor range (as well as a small number of bison hunters), a total of approximately 1500–3000 people per year. In recent years, 87% of this population have voluntarily used non-lead ammunition (either self-provided or courtesy of the Arizona Game and Fish Department), or have agreed to bury or haul out animal gut piles (to remove the possibility of scavenger exposure). Finally, Parish was forthright that the practice of simply giving away non-lead ammunition is not sustainable long-term. Rather, with the long game in mind, it is an olive branch that can build and incentivize change (by both slowly shifting the marketplace and changing minds).

The second thing that struck me was Parish’s focus on assumptions—specifically those that often inform conversations about lead ammunition. For instance, many hunters and ranchers apparently feel under attack from the government and the broader society (whether or not this is true). This widespread suspicion is one of the core factors that informs the dynamics of outreach regarding transition to non-lead ammunition. Parish was direct regarding the limits of government legislation and threats of litigation. Unsurprisingly, a significant amount of counter-information circulates online—this material repeats the inaccurate claim that lead poses no threat to scavenging animals, and also a broader libertarian argument that frames government regulations as an attack on individual (and in this case hunters’ and ranchers’ group) rights.

During our conversation, Parish outlined one way to think about behavioral change. An individual must believe that: there is a problem, there is a solution, and change is warranted and can make a difference. A key starting point is that science does not speak for itself. And more specifically, many hunters and ranchers have initial doubts regarding the link between lead ammunition and raptor mortality. With this in mind, he suggested that we think of at least two kinds of success. Version one is realizing a self-sustaining population of wild California condors. Yet this long-term goal is dependent on another, less glamorous, but vital kind of success: congenial conversations with key stakeholders. And in this respect, Parish stated that he (and other hunters/biologists similar to him) have had

great success in achieving meaningful conversations, one hunter to another. His approach follows as such: (1) build relationships and trust, (2) share information, scientific evidence, and answers, (3) give people time to think, (4) revisit the conversation in a respectful manner, and (5) when appropriate and possible, incentivize behavioral change (e.g., point to affordable sources of non-lead ammunition). Parish asserted that, taken together, these steps tend to promote a positive change in the thinking and practice of western U.S. hunters and ranchers central to condor recovery efforts.

#### 4.4. Pinnacles National Park

Pinnacles National Park was designated as a National Monument in 1908 due to its “unique geologic features such as rock spires and crags that are remnants of volcanic activity millions of years ago”.<sup>45</sup> In 2013, the U.S. Senate and President Obama passed a bill that redesignated Pinnacles as a National Park. I encourage readers to take a moment to search for images of the park—it is a spectacular place, and one well suited to the presence of huge condors.

Starting in 2003, Pinnacles became a release site for California condors. Over the next 15 years, in collaboration with the U.S. Fish and Wildlife Service and the Ventana Wildlife Society, the park released approximately 25 condors, while simultaneously working to educate local hunters, ranchers, and wildlife managers about the dangers of lead-based ammunition (Ibid, para. 4).

In late 2021 and early 2022, I spoke with the individual most directly involved in educational outreach, Daniel Ryan, Invasive-Wildlife Biologist and Non-Lead Ammunition Specialist at Pinnacles National Park.<sup>46</sup> At the time of our conversation, I had already spoken with the three experts above, and I was curious about how Ryan’s approach to non-lead ammunition outreach would align with what I had previously heard (not surprisingly, all four individuals are familiar with each other’s work).

I asked Ryan how he advocates for a behavioral shift away from the use of lead-based ammunition in the Pinnacles National Park region. He stated that the initial stage of outreach involves distributing accurate information. And ideally, it is preferable to lead with education (as opposed to legal mandates). Many Californian ranchers and hunters first encountered the issue of non-lead ammunition through a 2013 state-wide law imposed with minimal prior information or explanation. According to Ryan, this context made the early stages of outreach difficult. He stated that, outside California, the conversation is primarily about non-toxic bullets. Too often in California, the conversation is still about a state-level law that came into effect without sufficient stakeholder participation or public communication and educational outreach. A better approach, he suggested, would have been to first talk with stakeholders about why the legislation was necessary, and how it would impact them. Even better, they should have been invited to the table during initial planning, with the end goal being that “hunting organizations should be the ones that say ‘hey, we should use non-lead ammunition’”.

In simple terms, Ryan stated that local ranchers, hunters, and wildlife managers must first understand why there is a need to shift away from lead ammunition.<sup>47</sup> Second, these stakeholders must understand how to make this shift (i.e., be aware of alternative and effective forms of ammunition). Achieving these two goals means first identifying, and then contacting key stakeholders.

For the second part of the equation, the messenger matters. Ideally, this should be someone that “speaks the same language” and someone with shared experiences and values. Characterizing an ineffective approach, Ryan stated: “don’t drop a postcard from the government in mailboxes that says come to our offices to learn what you’re doing wrong”. Rather, build on existing relationships. Talk to ranchers that you have collaborated with in the past (e.g., on fencing or invasive plant projects) and ask them to host an event on their land. And crucially, ask them to talk to their neighbors and spread the word among the community. Ranchers convince ranchers. Ryan stressed that relationship building is

vital, and stated that through his current role at the NPS, he takes an approach of “we will come to you (without NPS badges)—we are on your side”.

Once hunters, ranchers, and wildlife managers understand the reason to adopt non-lead ammunition, the next phase often involves answering technical questions regarding the performance of such bullets. Ryan stated that one way to answer such questions is to set up informational booths at hunting expositions. Apparently even more impactful are shooting demonstrations at local ranches. At such events, local ranchers and hunters have the opportunity to try out non-lead ammunition, and to see first-hand the fragmentation outcomes of various bullets (e.g., lead versus copper). The use of ballistic gel allows participants to simulate the terminal result of various bullets upon hitting tissue. Seeing the fragmentation of a lead-based bullet is a powerful visual representation of how such fragments might ultimately harm scavenging wildlife. The downside of such educational trainings is that one must first get people to come out to the range. However, neighbors can often convince neighbors, and this form of hands-on, practical information-sharing is a highly effective way to strengthen relationships with local stakeholders.

I asked Ryan two additional questions regarding his background and professional title. First, are you a hunter, and if so does this affect your relationships with local hunters and ranchers? Second, to what extent (if any) does your job title as a federal employee affect your relationships with the same people? Ryan answered both questions with a clear appreciation for the importance of relationship-building.

Regarding the first question, he stated that yes he is a hunter, and also that he grew up on a farm. He stated that this shared background and experience allows him to jumpstart early relationships with local hunters and ranchers. To illustrate this point, he noted that an average hunter might shoot several animals a year, while a rancher might have to shoot invasive hogs on a regular basis. These situations are quite different, and in the latter case, there is a greater financial cost associated with a switch to non-lead ammunition. Someone without his hunting and farming background might not readily understand these differing contexts. The key, Ryan asserted, is that people are individuals. There may occasionally be truth to suggestions that much of the hunting community shares a value set, however, it is equally true that we should be cautious about aggregating people together into a homogenous group. Ryan affirmed the importance of relating to local hunters and ranchers as individuals first, individuals with unique contexts.

As for the second question, I hypothesized that Ryan might at times face a skeptical audience in that he speaks as an official representative of the federal government. Ryan answered that his uniform does on occasion spark an initial suspicion, but that the reverse also occurs—his title as a wildlife biologist for the National Park Service often affords him credibility that supports his messaging. More specifically, Ryan stated that his status as “a wildlife biologist that actually gets paid to shoot things is the major way I get that credibility”. He elaborated:

A badge and a uniform is fine, but when you get to say ‘well, I shot over 100 pigs last year—all non-lead’ that really does two things: (1) This guy shoots more than I do and gets paid to do it—he must know what he’s doing and he gets where I’m coming from as a hunter/rancher, and (2) Wait, he’s a ‘pro’ and he only uses non-lead? Maybe I should consider it too.

These specific responses, “he must know what he’s doing”, “he gets where I’m coming from”, and “maybe I should consider [non-lead] too”, all beautifully illustrate the powerful role source credibility can play in supporting a science-based and conversation-focused message. Reiterating this point, Ryan asserted that “a genuine rancher or hunter is better situated to understand the concerns and need of ranchers and hunters”. Such an individual will not only make her/his audience more comfortable and thus receptive to conservation-focused messaging, but s/he will also have the source credibility to state: “Here is why I think this bullet will work for you—because it’s worked for me”.

Above all, Ryan emphasized the importance of building positive relationships with local hunters and ranchers, relationships grounded in mutual respect, shared understand-

ing, and common goals. Specifically, he affirmed the importance of valuing ranchers' roles in providing open working landscapes for wildlife habitats. He highlighted the fact that wild animals do not respect human property boundaries (either a private ranch or national park), but rather cross back and forth between these habitats. By focusing on ranchers' and hunters' roles in supporting healthy ecosystems and wildlife populations, Ryan accentuated the benefits of bringing wildlife professionals, ranchers, and hunters together via a shared goal.

## 5. Conclusions

Efforts to save California condors are part of a bigger picture involving toxins and threats that indiscriminately kill or poison wildlife. As an iconic species and the largest flying bird in North America, the condor enjoys a degree of celebrity not afforded to most animals that die out of sight.<sup>48</sup> One example is the problem posed by ghost fishing gear throughout the world's oceans: "lost, abandoned, or discarded fishing implements" (Metych 2015, para. 4) that entangle and often kill ocean wildlife.<sup>49</sup> Another involves conibear and steel-jaw leghold traps that, "due to their nonselective nature . . . injure not only the wildlife species sought by trappers for their pelts, but also a wide array of unintended victims, including endangered and threatened species".<sup>50</sup> To the extent that both lead ammunition fragments and other human technologies cause the unintentional destruction of animal life, successful educational campaigns in one sphere may help to inform outreach in another.

Sorenson, Thomas, Parish, and Ryan have worked in the area of raptor and vulture conservation for many years. Across my conversations with each individual, several core principles emerged. It is worth emphasizing that these have not changed much over the last decade. Further, the organizations that these individuals represent were all doing the work described in the interviews long before the 2013 state-wide ban took effect. These two facts suggest: (1) the limits of a purely regulatory approach to eliminating the use of lead ammunition (California's ban has not achieved this result), and (2) the long timeframe associated with cultural and behavioral shifts (deep-seated traditions and practices are durable).

Indeed, the fact that educational outreach is still needed suggests the importance of circulating this paper's findings to a broad audience of conservation professionals. Above all, it suggests the importance of identifying credible messengers—individuals well-positioned to engage and build relationships with key stakeholders. Given that Bill AB-711 alone is not enough to eliminate lead ammunition in California, these stakeholders' actions are central to condor restoration efforts.

A number of scholars offer frameworks for motivating behavior change and suggest key steps in the message design and implementation. For instance, Jacobson (2009) presents a sequenced communication strategy for adjusting peoples' "conservation awareness and attitudes" (p. 1). McKenzie-Mohr (2011) proposes a set of five steps: select behaviors, identify barriers and benefits, develop strategies, pilot the strategy, and broad-scale implementation. Lee and Kotler (2019) suggest a different set of steps that include (in part): describe the purpose; select a priority audience; set target goals; identify audience barriers and motivators; craft a positioning statement; create a plan for evaluation; organize funding; complete a marketing and implementation plan (p. 50).<sup>51</sup>

In the field of science communication, Schweizer et al. (2009) offer a list of ten "message-design suggestions [for producing] more effective messages about climate change" (p. 272). In a paraphrased form, they are as follows:

1. Know your audience and select a credible messenger for that audience.
2. Lead with your strongest argument.
3. Connect your message to cultural values and beliefs [including shared traditions and experiences]—not abstract concepts and scientific data.
4. Appeal to values that are meaningful for your audience.

5. Empower your audience—tell them what specific actions they can take to make a difference.
6. Help the audience to understand interrelationships and interconnections.
7. Partner with other individuals and organizations.
8. Change your organization’s internal practices to model the desired behavior change.
9. Communicate about your organization’s actions.
10. Situate the issue in a specific location.

Each framework above has its assets. For instance, Lee and Kotler rightly advise that campaigns identify core audience barriers and motivators. McKenzie-Mohr’s model is elegantly concise, and also emphasizes the importance of identifying barriers to change. However, despite its focus on climate change messaging, I believe the Schweizer et al. model offers a particularly constructive starting point for analyzing this article’s takeaways regarding source credibility and an audience-focused message design.

Step 2 (lead with your strongest argument) is essential. And of course, an argument’s ‘strength’ or impact depends on its adaptation to a specific individual or audience (such as a local rancher). There is significant overlap between steps 3 and 4 with respect to the importance of audience values. Step 6 is sage advice, especially in light of the interconnected nature of lead ammunition fragments and condor scavenging behaviors. Step 7 highlights the importance of relationship-building and collaboration. And, done well, steps 8–9 can clearly establish and/or enhance an organization’s perceived credibility on a given issue. Finally, step 10 is directly relevant to condor restoration initiatives, in that the discharge of lead-based ammunition by hunters, ranchers, and wildlife managers is site-specific. Further, by tracking individual California condors, the VWS is able to identify specific ranches where condors scavenge, and thereby focus outreach to stakeholders affiliated with those ranches.

Above all, three particular suggestions (steps 1, 3, and 5) most explicitly harmonize with the recommendations offered by this article’s interviewees. Each is audience-focused and attests to the inter-relationship between shared values, source credibility, and audience empowerment:

1. *Know your audience and select a credible messenger for that audience*

The sum of a combination of factors including perceived intent, competence, expertise, trustworthiness, and charisma, source credibility plays a formidable role in shaping how (and whether) non-specialist audiences engage scientific research. Put simply, insiders from within a group/community, particularly when perceived as well-intentioned, often have the best chance of being taken seriously by others in that group/community.<sup>52</sup>

The ideal messenger for an audience of hunters, ranchers, and/or wildlife managers is someone that “speaks the same language”—someone with shared experiences and values. And although it is sometimes possible to enhance an individual’s credibility through behavioral shifts and/or message adaptation, years of shared experiences afford some messengers an “authenticity” and persuasive magnetism. Someone that can say, “I shot over 100 pigs last year—all non-lead” can engage a hunting audience in ways that a non-hunter cannot. In a similar fashion, a compelling way to get local ranchers to attend a non-lead shooting demonstration is to encourage other ranchers to make the invitation. Messages that arise from within a community often carry persuasive weight.

2. *Connect your message to cultural values and beliefs [including shared traditions and experiences]—not abstract concepts and scientific data*

Removing lead ammunition fragments from the natural environment requires convincing stakeholders that there is a problem *and* a reasonable solution. Of course, “reasonable” is subjective—this suggests the importance of building on shared values. Science and evidence do not speak for themselves—they require clear and compelling translation. For instance, [Schaefer and Beier \(2013\)](#) note that “wildlife managers rarely turn to the primary literature, relying instead on common sense, personal experience and advice from other managers” (p. 2).



There are immense benefits to engaging local populations in a manner that promotes a community-grounded conservation ethic—the kind of thing that the NANLP calls, “hunters leading the way in conservation”.<sup>53</sup> All four interviewees agreed that the best way to connect with hunters, ranchers, and wildlife managers is through an accentuation of shared values—specifically, a conservation ethic that accentuates a long tradition of protecting the natural environment. Again, a credible messenger makes this easier by far. Someone who can discuss the technicalities of hunting and invasive species management can gain the trust of a hunter, rancher, or wildlife manager far quicker than someone who lacks this shared experience. Further, all four interviewees emphasized that building positive relationships requires treating stakeholders as individuals. To create trust, respect, and mutual understanding—all preconditions for motivating long-term behavioral change—conservation practitioners should listen to individuals’ ideas and concerns, and identify shared values and goals.

### 3. Empower your audience—tell them what specific actions they can take to make a difference

Stakeholder support is crucial to a conservation program’s long-term success (Peake et al. 2009; Curti and Valdez 2009; Ross-Winslow and Teel 2011; Cartwright et al. 2012). One way to encourage such collaboration is to build on existing strengths, and frame behavioral shifts as reasonable and straightforward. One concrete example is the Ventana Wildlife Society’s program of offering non-lead ammunition to the owners of important ranches in the condor scavenging range. By co-hosting non-lead shooting demonstrations on local ranchers’ properties, the Institute for Wildlife Studies and the National Park Service offer a parallel invitation to key stakeholders. Crucially, these educational events are framed as an opportunity to build on ranchers’ existing commitments to supporting a healthy ecosystem—including the provision of condor habitat and food sources.

It is worth highlighting one additional point. All four interviewees stated that there are limits to a regulatory-based approach to removing lead ammunition fragments from the environment. A total ban is nearly impossible to enforce, and in the words of Parish, if hunters and ranchers “don’t understand [the legislation], they might well write it off [as] unnecessary”. Here again, source credibility plays a vital role. A peer hunter or rancher is generally best positioned to frame the (ultimately voluntary) adoption of non-lead ammunition as a simple, important, and impactful choice that builds on an existing commitment to environmental conservation.

A visit to the western entrance of Pinnacles National Park involves a beautiful drive through windy vineyards and then large ranches before the high peaks suddenly emerge into view. From 2004 to 2006, the park service contracted wildlife biologists from the Institute for Wildlife Studies to “eradicate exotic pigs” within an approximately 24-mile long fence-enclosure.<sup>54</sup> In their many meetings with local ranchers, Ryan and an IWS partner answered technical questions about the performance and ballistics of the non-lead ammunition used to cull hundreds of wild pigs. This ability to discuss the technical elements of hunting and ammunition use clearly communicates the message, *I am one of you*. The correlated implication is, *I value your ideas and traditions*. When these grounds of trust and commonality are established, it becomes more likely that an open discussion about the benefits and logistics of a transition to non-lead ammunition can take place.

Working toward a shared goal from unique vantage points, the Ventana Wildlife Society, the Institute for Wildlife Studies, The Peregrine Fund, and Pinnacles National Park are engaged in significant environmental education in the realm of condor conservation. In building trust and fostering positive long-term relationships with key stakeholders, each institution employs and, over time, strengthens its capacity with respect to source/messenger credibility. Nine years after California’s statewide ban on lead ammunition came into force, the continued need for educational outreach on this issue indicates the importance of trust-based relationships with key stakeholders. Crucially, certain individuals are best-situated to establish and build these relationships, and thereby encourage the voluntary adoption of non-lead ammunition. As one element of a broader communication strategy, increased

attention to the impact of source credibility would augment the educational outreach of diverse wildlife conservation programs across the globe.

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## Notes

<sup>1</sup> Para. 7: <https://www.nps.gov/pinn/learn/nature/california-condor-information.htm> (accessed on 7 July 2022).

<sup>2</sup> See: <https://www.nps.gov/articles/california-condor-recovery.htm> (accessed on 7 July 2022). For background on the controversy associated with condor conservation projects in the 1980s, see: (Alagona 2004).

<sup>3</sup> Para. 9: <https://wildlife.ca.gov/Conservation/Birds/California-Condor> (accessed on 7 July 2022).

<sup>4</sup> See: <https://www.theguardian.com/us-news/2022/apr/16/california-condors-yurok-tribe> (accessed on 7 July 2022).

<sup>5</sup> Personal correspondence with Kelly Sorenson, and paras. 6, 10: <https://www.nps.gov/subjects/condors/threats.htm> (accessed on 7 July 2022). For discussion of the risks of eggshell thinning associated with DDE contamination, see Burnett et al. (2013).

<sup>6</sup> Para. 1: <https://www.nps.gov/articles/california-hunters-continue-wildlife-conservation-tradition.htm> (accessed on 7 July 2022); See also: (Stake 2019).

<sup>7</sup> See: <https://www.audubon.org/news/lead-ammo-top-threat-condors-now-outlawed-california> (accessed on 7 July 2022).

<sup>8</sup> These two sites are administered by: (1) the Institute for Wildlife Studies, and (2) the Oregon Zoo, The Peregrine Fund, and the Institute for Wildlife Studies.

<sup>9</sup> See: <https://mwrwildlife.org/avian-2/raptors-and-vultures/> (accessed on 7 July 2022).

<sup>10</sup> All interviewees give their consent to be identified and quoted in this article.

<sup>11</sup> Para. 6: <https://ca.audubon.org/news/while-federal-ban-lead-ammo-gone-dangers-birds-and-people-will-persist> (accessed on 7 July 2022).

<sup>12</sup> For discussion of the risks posed by lead ammunition to wildlife and humans, see: <https://www.nps.gov/pinn/learn/nature/leadinfo.htm> (accessed on 7 July 2022); See also: <https://www.nytimes.com/2018/11/27/us/california-today-banning-lead-ammunition-to-save-the-condors.html> (accessed on 7 July 2022).

<sup>13</sup> Lead remains in widespread use, particularly in batteries. See: <https://www.npr.org/2016/04/06/473268312/before-it-was-dangerous-lead-was-the-miracle-metal-that-we-loved> (accessed on 7 July 2022).

<sup>14</sup> P. 2: <https://escholarship.org/uc/item/6dq3h64x> (accessed on 7 July 2022).

<sup>15</sup> The ban is only for the use of targeting wildlife—the law does not ban the use of lead ammunition at target ranges where wildlife is presumed to be unaffected (thanks to Kelly Sorenson for clarifying this point).

<sup>16</sup> AB711 expanded AB821 (2008) statewide for all hunting. AB3071 (2020) was a proposed ban on the sale of lead ammunition for recreational shooting at public ranges. AB3071 was later retracted by its author prior to debate.

<sup>17</sup> Perhaps unsurprisingly, a common thread through arguments in support of the ban centered on the negative health implications for hunters' families, a framing of the issue that potentially aligns with the idea that humans mistreat other animals due to "public consent supported by a morally speciesist-anthropocentric system of values" (Almiron et al. 2018, p. 367). For instance, the University of California Press guidebook, *Introduction to the California Condor*, suggests that "It may prove wise to promote the phaseout of lead ammunitions primarily on the basis of benefits to human health" (Snyder and Snyder 2005, p. 231).

<sup>18</sup> See: <https://www.newsweek.com/lead-bullets-kill-twice-fight-ammunition-made-618442> (accessed on 7 July 2022); for additional context, see also: <https://news.bloomberglaw.com/environment-and-energy/california-becomes-first-state-to-ban-lead-bullets-for-hunting> (accessed on 7 July 2022).

<sup>19</sup> It is nearly impossible to differentiate between lead and non-lead bullets.

<sup>20</sup> In 2011 (the last year of readily available poaching statistics), there were 501 deer-related violations in California. This does not necessarily mean poaching (hunting without the required tag), as it can also include hunting with incorrect weapon requirements, out of the assigned zone, etc. This is overshadowed by the 29,000 legally harvested deer (personal communication with Chad Thomas).

<sup>21</sup> For a discussion of the benefits of positive messaging, see: (Jacobson et al. 2019).

<sup>22</sup> Two other productive frameworks for thinking about how varying messages compete for audience attention and acceptance are those of ideology and discursive battle (Hall 1982; LaRocque 2010).

<sup>23</sup> For a discussion of the rhetorical dynamics of the North American hunting community, see: (Belanger 2021).

- 24 See also para. 12: <https://www.newyorker.com/magazine/2017/02/27/why-facts-dont-change-our-minds> (accessed on 7 July 2022).
- 25 See: <https://www.ventanaws.org/baldeagles.html> (accessed on 7 July 2022).
- 26 The breeding facilities are the LA Zoo, SD Zoo, Oregon Zoo, and The World Center for Birds of Prey TPF facility in Boise, ID.
- 27 See: <https://www.ventanaws.org/condorfieldwork.html> (accessed on 7 July 2022); for an overview of the organization’s recent work, see: [https://www.ventanaws.org/uploads/6/7/1/3/67132355/fy20\\_annual\\_report\\_small.pdf](https://www.ventanaws.org/uploads/6/7/1/3/67132355/fy20_annual_report_small.pdf) (accessed on 7 July 2022).
- 28 See: <https://www.ventanaws.org/ammunition.html> (accessed on 7 July 2022).
- 29 In earlier years, the VWS supported attempts to legislate a ban on a national level.
- 30 In a follow-up email exchange, Sorenson highlighted the VWS’s longstanding commitment to building credibility and establishing positive relationships with local stakeholders: “The fact that we as an environmental organization would spend the last 10 years buying ammunition for hunters and ranchers, become experts on the non-lead ammunition market, become a licensed ammunition vendor, and actively help hunters and ranchers through the state regulations (i.e., the background checks) that complicate ammunition purchasing—the fact that we do all of that—resonates well with hunters and ranchers”.
- 31 Although I have not seen the forthcoming videos, I am curious about whether the VWS version builds upon existing models of hunter-focused outreach videos such as this one, featuring Leland Brown (a biologist at the Oregon Zoo, and cofounder of the North American Non-lead Partnership) who speaks with a rancher about the technical differences between lead and copper ammunition on the program “Born and raised outdoors”: <https://www.youtube.com/watch?v=Y796BmDsAeQ> (accessed on 7 July 2022); for information about Brown’s work, see: <https://www.oregonzoo.org/news/2015/02/zoo-engage-hunters-wildlife-lead-issue> (accessed on 7 July 2022).
- 32 In a subsequent email exchange, Sorenson specified: “this is the most common rifle caliber in use and [its typically used] for small, non-game mammals, like ground squirrels”. Often taking place “in rural ranching communities where enforcement is next to impossible [this] is important because these are the carcasses that are unlikely to be collected by the shooter and more likely to be available to scavengers”.
- 33 <https://www.iws.org> (accessed on 7 July 2022).
- 34 Since the time of writing, <https://huntingwithnonlead.org> has updated its website. This quotation is no longer on that site, however, it can be found at: <https://www.friendsofcondors.org/lead-ammunition> (para. 4) (accessed on 7 July 2022).
- 35 Thomas has worked as a predator biologist with the IWS under a DoD contract (terrestrial mammals), but was not involved in the culling of feral hogs in Pinnacles National Park.
- 36 See: <https://www.peregrinefund.org/projects/north-american-non-lead-partnership> (accessed on 7 July 2022).
- 37 See: <http://nonleadpartnership.org/news/en> (accessed on 7 July 2022).
- 38 See: <https://www.peregrinefund.org/mission-and-vision> (accessed on 7 July 2022).
- 39 See: <https://www.cbsnews.com/news/california-condor-comeback-hunters/> (accessed on 7 July 2022).
- 40 Para. 8: <http://nonleadpartnership.org/news/en> (accessed on 7 July 2022).
- 41 See: <http://nonleadpartnership.org/resolution/en> (accessed on 7 July 2022).
- 42 Para. 7. <http://nonleadpartnership.org/news/en> (accessed on 7 July 2022).
- 43 See note 36 above.
- 44 See note 41 above.
- 45 Para. 5: <https://www.nps.gov/pinn/learn/historyculture/present-day.htm> (accessed on 7 July 2022).
- 46 For additional background on Ryan’s work in the sphere of non-lead ammunition, see: [https://www.nps.gov/articles/000/pinnacles-biologist-shares-non-lead-ammunition-expertise-with-olympic-volunteers.htm?utm\\_source=article&utm\\_medium=website&utm\\_campaign=experience\\_more&utm\\_content=small](https://www.nps.gov/articles/000/pinnacles-biologist-shares-non-lead-ammunition-expertise-with-olympic-volunteers.htm?utm_source=article&utm_medium=website&utm_campaign=experience_more&utm_content=small) (accessed on 7 July 2022).
- 47 N.B., in many instances, simply providing an audience with additional information does not lead to behavioral change. As this article suggests, successful environmental messaging generally transcends an ‘information deficit’ model and adapts communication to harmonize with an audience’s existing beliefs and values.
- 48 Via personal correspondence, Daniel Ryan provided additional context on this point. He writes: “Critically helpful to this is that each condor has a radio or GPS transmitter that has a specific ‘mortality’ signal. We can quickly recover a huge portion of the species’ population when they die due to these transmitters allowing us to perform necropsies and determine a cause of death. This level of mortality knowledge for an entire wild species is rare and possibly unprecedented”.
- 49 Somewhere between 500,000 and 1 million tonnes of derelict fishing gear is discarded, lost, or abandoned in the oceans every year. See p. 10: [https://europe.nextbook.com/nxteu/wwfintl/ghost\\_gear\\_report/index.php](https://europe.nextbook.com/nxteu/wwfintl/ghost_gear_report/index.php) (accessed on 7 July 2022); see also <https://oceanservice.noaa.gov/facts/ghostfishing.html> (accessed on 7 July 2022).
- 50 Para. 2: <https://awionline.org/press-releases/legislation-ban-brutal-and-indiscriminate-body-gripping-traps-reintroduced> (accessed on 7 July 2022).
- 51 This list is condensed for concision.

- 52 For a discussion of political and cultural tribalism, see: (Chua 2019).
- 53 See: <http://nonleadpartnership.org/home/en> (accessed on 7 July 2022).
- 54 See: <https://www.nps.gov/pinn/learn/nature/wildpigs.htm> (accessed on 7 July 2022).

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