OVERVIEW

The Oregon Zoo’s mission is to inspire our community to respect animals and take action on behalf of the natural world. The Non-lead Hunting Education Program (newly renamed to better reflect the programs goals) addresses a priority wildlife conservation and animal welfare issue by encouraging stakeholders to adopt the use of non-lead ammunition.

The second year of the Non-lead Hunting Education Program was highlighted by a number of great successes as well as a number of challenges. Implementation of the outreach plan continued, with specific focus early in the year at attending outdoor sports shows and gatherings with display booths. Throughout the year, emphasis was placed on engaging with stakeholder groups with whom a relationship was already established, as well as pursuing relationships with new stakeholder groups. In particular, work with Oregon Hunters Association (OHA) continued and was expanded into a partnership with The Nature Conservancy (TNC) and the Oregon Department of Fish and Wildlife (ODFW), to increase use of non-lead for management hunts on TNC’s Zumwalt Prairie Preserve. A close working relationship with OHA has assisted in sharing information with chapters across Oregon. Additionally, cooperation with ODFW has helped ensure that the Non-lead Hunting Education Program is fulfilling needed training opportunities for staff that interact with stakeholders on a regular basis. Washington State and the Nez Perce Tribe have also requested assistance with new outreach efforts, providing opportunities for more outreach messaging across a wider area of the Pacific Northwest.

Despite the high degree of positive outreach progress, there have been significant challenges in hosting the planned ammunition testing days at ranges. There have been obstacles in securing agreements from ranges to host events, either with direct disapprovals or through lengthy communications delays. Efforts have shifted to focus on stronger partnerships with local chapters of hunting organizations to create opportunities for members to test ammunition. This will hopefully ameliorate the concerns of ranges in being involved with ammunition testing opportunities. Despite those challenges, 2016 was a very successful year of outreach with 6,188 individual outreach contacts made via 30 days of educational booths, 22 presentations, one ammunition testing event, and nine meetings with various stakeholder groups. Additionally, the implementation of evaluation protocols resulted in 165 survey responses. As the program continues, evaluation efforts will be adapted to increase participation and program responsiveness. Additional relationship-building opportunities planned over the next year include training opportunities for the International Hunting Education Association Conference attendees, and educational booths at sport’s shows and further partnerships with hunting conservation groups. It is hoped that these relationships will result in more ammunition testing events for stakeholders.

Early results from evaluation efforts of the program indicate a high success in increasing participants intended use of non-lead ammunition. Although sample sizes remain low, methodology has been improved and allows for consistent feedback from outreach participants. Complete surveys (N=83) indicate that 58% of respondents use non-lead ammunition for at least one class of hunting but only 2% of those currently use non-lead ammunition for all types of game they pursue. However, survey data also shows that 89% of hunters who responded to questions about intended ammunition choices for different game types (N=53), were considering using non-lead ammunition for at least a portion of the
game they hunt. Of those, 40% were considering using non-lead ammunition exclusively for all types of
game they hunt (see page 14 for a more detailed review of evaluation efforts).

Table 1

<table>
<thead>
<tr>
<th>Activity Type</th>
<th>Total Events Planned for Year 2</th>
<th>Total Completed Events Year 2</th>
<th>Total Number of Contacts Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shooting Demonstrations</td>
<td>4</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Presentations</td>
<td>6</td>
<td>22</td>
<td>603</td>
</tr>
<tr>
<td>Display Booths (Days)</td>
<td>12</td>
<td>30</td>
<td>5514</td>
</tr>
<tr>
<td>Trainings</td>
<td>N/A</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Meetings</td>
<td>N/A</td>
<td>9</td>
<td>60</td>
</tr>
<tr>
<td>All Activities Combined</td>
<td>22</td>
<td>63</td>
<td>6188</td>
</tr>
</tbody>
</table>

BACKGROUND

Lead has long been recognized as a human and wildlife health hazard. Efforts to reduce human exposure
to lead include removal from paint and gasoline, limits on emissions and even conversion to the use of
non-lead ammunition by the U.S. Army. However, the threat to wildlife from lead ingested from animals
killed with lead ammunition remains. Multiple scientific studies have identified the use of lead hunting
ammunition as a source of lead toxicosis (Haig et al. 2014, Finkelstein et al. 2012, Lambertucci et al.
2011). Of particular concern are avian scavengers that frequently consume the remains of animals shot
with lead ammunition.

Population level effects due to lead exposure are difficult to assess, but there is no doubt that California
condor recovery is in jeopardy due to lead exposure. During the first 17 years (1992-2009) of the
reintroduction program, 23 condors died from lead poisoning, making it the single biggest source of
adult mortality (35%). Between 2010 and 2012 lead accounted for 83% of mortality (Johnson et al.
2014). Adult mortalities have a great impact on the population of a long lived, slowly reproducing
species. Until mortality from lead poisoning is reduced, the population of wild condors will not be
sustainable without supplementation from the captive breeding facilities (Oregon Zoo, San Diego Zoo,
Los Angeles Zoo, World Center for Birds of Prey) combined with intensive management of birds in the
wild (annual captures, blood lead level assays, chelation treatments and care for acutely poisoned birds)
(Finkelstein et al. 2012). As California condors are obligate scavengers completely reliant on carrion, and
the wild populations are subject to intensive monitoring, condors can be thought of as sentinels for lead
contamination of carcasses throughout their range (Rideout et al. 2012). Morbidity from lead has also
been documented in other avian species including protected species such as golden eagle (Stephens et
al. 2005, Stauber et al. 2010) and bald eagle (Bedrosian et al. 2012). A review of mortality for both bald
and golden eagles across the United States documents poisoning as the leading and fourth most
frequent causes of death respectively (Russell & Franson 2014). Lead poisoning was documented as the
leading cause of poisoning mortality in both bald and golden eagles. For bald eagles 63.5% of poisoning
mortalities were attributed to lead poisoning between 1982-2013, while lead poisoning in golden eagles
causd 58.1% of poisoning mortality from 1975-2013 (Russell & Franson 2014). Worldwide, more than
120 species have been documented as being affected by lead ammunition (Haig et al. 2014) at least 5 of which have protected status (Fisher et al. 2006). During testing of wild golden eagles in Washington state >50% of tested wild birds were reported with excessive blood lead levels (Watson & Davies 2009). An agreement was signed in 2014 between the Yurok Tribe, USFWS, the National Park Service and other organizations to conduct an experimental release of condors on the North California Coast. Condors released in this area will likely fly into SW Oregon adding yet another species to those living in Oregon that are known to be impacted by lead ammunition. Several ongoing studies in Oregon (with support from the Oregon Zoo) are investigating links between specific hunting activities and wildlife lead exposure.

Several strategies that may reduce wildlife lead exposure are available to hunters. These include removing gut piles and limiting the location and season of hunting based on raptor ranges and nesting behavior. However, there is general agreement that the use of non-lead (typically copper) ammunition is the most effective and practical solution to eliminate unintended lead exposure in wildlife. Use of non-lead ammunition for hunting has been shown to decrease lead exposure in scavenging species (Bedrosian et al. 2012, Kelly et al. 2011). Unfortunately, distrust between stakeholders, fostered by extreme views from both gun rights and non-hunting conservation organizations, together with limited knowledge of and availability of viable alternatives to the use of lead ammunition has so far inhibited any substantial behavior change.

The state of California has approached the issue of wildlife lead exposure via ammunition from a legislative standpoint with mixed results. Although CA AB711 will require the use of non-lead ammunition for all hunting by 2019, lack of education and passage of legislation without collaboration with stakeholders has resulted in questions about levels of compliance. Adherence to any regulation can only be as successful as the belief by individuals that the law is just and reasonable, and belief they have the ability to comply. Many stakeholders have felt disenfranchised by the passage of CA AB711 and as a result do not believe the law to be just or reasonable. Confusion over availability and effectiveness of non-lead ammunition further complicates compliance rates. In contrast, a voluntary program in Arizona developed by Arizona Game & Fish (supported by hunter stakeholder groups) that combined education, ammunition exchanges, and incentives for gut pile removal reached compliance levels of >90% in 2014 and has been associated with significant reductions in the amount of lead available to scavenging species (A. Zufelt, personal communication, Seig et al. 2009). Similar programs are underway in California, notably by the Institute for Wildlife Studies (IWS), National Park Service, Ventana Wildlife Society, and by the Yurok Tribe’s “Hunters as Stewards” program.

**Wildlife and Lead Outreach Program goals:**

- Decrease lead exposure in wildlife from lead ammunition by
  - Increased use of non-lead ammunition by shooters for use in harvesting animals
  - Increased community support for the use of non-lead ammunition
  - Increased use of non-lead ammunition for wildlife management operations by wildlife and resource management agencies

**Stakeholder groups:**
Stakeholder groups have been identified for outreach. These include hunters, landowners, sportsmen’s organizations, wildlife agencies and members of the public.

**Table 2**

<table>
<thead>
<tr>
<th>Hunters</th>
<th>Includes anyone actively shooting animals. Big game, predators, varmint, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landowners</td>
<td>Individuals or organizations that conduct or allow the taking of any animal (wildlife or livestock) with firearms on their property.</td>
</tr>
<tr>
<td>Sportsmen’s Organizations</td>
<td>Sportsmen conservation organizations (e.g. Oregon Hunter’s Association, Rocky Mountain Elk Foundation, Theodore Roosevelt Conservation Partnership, etc.), promote partnership and cooperation.</td>
</tr>
<tr>
<td>Wildlife &amp; Resource Management Agencies</td>
<td>Federal, state and local wildlife management agencies (USFWS, USFS, ODFW, USDA-WS, etc.).</td>
</tr>
<tr>
<td>Native American Tribes</td>
<td>Tribal groups have significant interest in preserving wildlife, including traditional use and spiritual beliefs.</td>
</tr>
<tr>
<td>Public</td>
<td>All members of the public. Focus on wildlife conservation and ammunition users contributions to wildlife and habitat conservation while promoting the use of non-lead ammunition.</td>
</tr>
</tbody>
</table>

**Barriers to Adoption:**

More than ten years of outreach by several organizations throughout the western United States has identified both actual and perceived barriers influencing stakeholders in making the switch from lead to non-lead ammunition. These include:

1. **Performance:** Many stakeholders are unaware or misinformed of the performance characteristics of non-lead ammunition. These include internal, external and terminal performance, such as barrel fouling, accuracy and expansion.
2. **Cost:** Non-lead ammunition qualifies in the premium bullet category and is priced accordingly. Although priced comparably to lead ammunition in the same category, non-lead ammunition often costs significantly more than typical, common lead ammunition. There is often confusion about how much non-lead ammunition costs and whether stakeholders can afford it.
3. **Sociopolitical factors:** Some gun rights organizations have conflated the use of non-lead ammunition with an anti-hunting or anti-firearm position. Likewise, certain conservation groups with interest in banning the use of lead ammunition have consistently taken positions against the continuation of hunting, contributing to confusion among stakeholders. Additionally, the positions of sportsmen’s organizations strongly influence membership beliefs and attitudes about non-lead ammunition and specific outreach programs.
4. **Accessibility:** Non-lead ammunition is rarely labeled as such, making identification particularly difficult for individuals without extensive knowledge. Non-lead ammunition is not carried by all local retailers and is not available for certain calibers.
5. Awareness and belief in scientific evidence: Along with claims that advocating for the use of non-lead ammunition is anti-hunting, there have been multiple attacks from special interest groups on the validity, or even the existence, of scientific evidence indicating lead ammunition as the source of lead exposure in wildlife. Stakeholders often have no knowledge of the over 500 published studies identifying lead ammunition as a source of lead exposure for multiple species, including California condors, golden eagles and bald eagles, among others.

ACTIVITIES

Signatory support of a coalition agreement

Developing a coalition agreement that hunting organizations feel comfortable to join will allow members of these organizations to participate in the shift to non-lead ammunition without first having to defuse mistrust in the underlying purpose of the outreach effort. Reaching hunting organizations can therefore be very effective due to their large membership. By gathering support of respected hunting organizations, a coalition agreement could result in the contact of several thousands of individuals per organization. There is some precedent for the effectiveness of a coalition agreement for this type of effort. The state of Arizona developed such an agreement and was able to elicit support from multiple hunting organizations. This, in turn, successfully helped to build a high level of acceptance for the use of non-lead ammunition to protect avian scavengers among local hunters.

After discussion with partners this effort has been delayed for the current time. There have been some discussions as to whether a coalition agreement is the appropriate tool, and recommendations to pursue a resolution agreement instead. This may make both signing and understanding the goal of the agreement easier to accomplish. As relationships continue to build, and there is momentum in creating a more formal group it will be readdressed. The current hesitancy of stakeholder groups minimizes the benefit of this document until a point in time where they are more comfortable in taking a stance on this issue. Until then, pushing organizations for signatures may develop a wedge in new working relationships that do not benefit the outreach efforts. As efforts continue to develop stronger relationships with stakeholder groups and agencies, the coalition or resolution will be brought forward as an important step in cementing commitments to prevent lead exposure in wildlife.

Presentations at stakeholder gatherings

Hunters and landowners are the two stakeholder groups typically using lead ammunition in ways that result in the unintended poisoning of wildlife. As such, they are the main stakeholders in any effort to transition from lead to non-lead ammunition as a preferred, normalized behavior. Development of outreach efforts, materials and events will therefore focus on hunter-specific issues, but will remain accessible to the general public. Although outreach targets the hunting community as the focus for behavioral change, the general public remains a major stakeholder in the conservation of wildlife. Presentations will be tailored for the expected audience (i.e. hunters/shooters, general public or wildlife agency personnel). Venues for presentations include agriculture meetings, hunter organization chapter meetings, ODFW hunter educator conferences and conservation organization meetings among others.
The second year of outreach identified a goal of six presentations to stakeholder groups. Through cooperation of stakeholder groups the Non-lead Education Program was able to conduct a total of 20 presentations. These included presentations to OHA Chapters and leadership (6), Audubon Society chapters (2), University students (2), shooting range members and several other stakeholder groups. Presentations continue to be well received and, as evidenced by comments received, have changed the minds of some individuals who were previously skeptical that the issue is a valid conservation concern. Several presentations have resulted in invitations to present to additional venues. Stakeholder presentations will remain a critical avenue for distributing information to new areas, and build relationships that may result in additional outreach opportunities. A presentation to the OHA President’s Summit in August directly demonstrated that: chapter leaders present were immediately interested in scheduling presentations for their individual chapters. Those presentations to local chapters in turn provide opportunities to offer non-lead ammunition testing days in partnership with the chapter. Additionally, local chapter members are well known in the local stores, and have the influence to request non-lead ammunition be stocked on shelves with much greater success than requests from the Non-lead Hunting Education Program.

Educational display booths

Educational booths were staffed for a total of 28 days contacting a total of 5,406 individuals. High Desert Museum again hosted a booth at their International Vulture Day celebration, and Oregon Zoo volunteer corps also staffed a booth during the same day for Oregon Zoo’s International Vulture Day. The support
of trained volunteer staff greatly extended the range of outreach on these crucial educational opportunities. Volunteer support was also critical to the staffing of the booths at five separate sports shows for a total of 18 days of outreach. The outreach booths allow for high volume contact and what is often a first exposure to the concern of lead exposure in wildlife from ammunition. Additionally, outreach booths provide incredible training opportunities for volunteers, which can then be leveraged for additional coverage, as in the case with the International Vulture Day events. A booth at the national Backcountry Hunters and Anglers Rendezvous was also staffed in a partnership with several other outreach programs. This allowed leveraging efforts from multiple partners to build knowledge within a well respected national organization. Although it was a smaller event, a large number of very important contacts and discussions were made. Other booths were staffed at Oregon Zoo event days, including Endangered Species Day and the summertime community evening events “Twilight Tuesdays.” In all events on Oregon Zoo grounds, numerous hunters were contacted as well as non-hunting members of the general public, and the majority of those who hunted were willing to consider the switch to non-lead ammunition.

Figure 2: Talking with Hunters at Sport’s Show
Shooting demonstrations

Shooting events that demonstrate the effectiveness of ammunition alternatives present a unique opportunity to engage with hunters on a one-on-one basis. Demonstration of lead ammunition fragmentation in real time has significant power in connecting types of ammunition usage and wildlife lead poisoning. The use of ballistic gelatin and water barrel bullet collections allows for attendees to reference bullet performance during real life scenarios. These events also allow hunters to test non-lead ammunition in their own rifles for free, which may help to convince them of the possibility to change their current habits. Ammunition is only provided for target shooting during the event; participants will be able to test fire ammunition at the range but will not receive enough for any use other than the approved accuracy testing at the event.

Although ammunition testing events are considered a high value outreach opportunity, they are also one of the most complex events to hold. They require agreements of shooting range facilities, as well as engagement with large groups of stakeholders. Despite efforts to set up ammunition testing events, including contact with eight ranges throughout Oregon, only one non-lead testing event was completed during the second program year. The event was held on August 20, 2016 at Eagle Cap Shooting Association’s range in Enterprise, OR. This was lightly attended and resulted in only eight contacts, although several attendees were planning on hunting on The Nature Conservancy’s Zumwalt Prairie Preserve. Due to TNC’s request that hunters on their property use non-lead ammunition the attendees were very interested in testing and at least one found a load that he was interested in using during the hunting season. Other ranges had a variety of responses, including direct refusal to host any event that included non-lead ammunition education and invitations to present to range members to gauge interest. Multiple ranges expressed willingness, but substantial delays in communication made developing and hosting an event nearly impossible. Focus has been shifted from engaging ranges as leaders in setting up ammunition testing days, to working directly with local hunting organization chapters, many members of which are also range members. As local community members and range members, they may be better connected and equipped to develop non-lead ammunition testing events. This may also attract more active hunter attendees, thereby increasing the likelihood for behavior change that will directly benefit wildlife.
Training educators and staff

Wildlife agency personnel and Oregon Zoo staff, members and volunteers have regular contact with the public or stakeholder groups and will need additional training on how to best communicate with these groups about the outreach efforts and to ensure consistent messaging. These training efforts will focus on the current scientific knowledge surrounding wildlife and lead poisoning, contributions of hunters to conservation and techniques for switching from lead ammunition to non-lead alternatives. Helping to increase the number of knowledgeable individuals with regular public contact will further increase the quantity and quality of information being distributed to potential stakeholders.

Since spring of 2016, the Non-lead Hunting Education Program has been consulting and assisting several groups in developing training opportunities for multiple organizations. The program coordinator conducted training session during the annual Oregon Chapter of The Wildlife Society Conference (OR-TWS) in February 2016. Interest from the workshop held in November 2015 and the overall outreach program also led to contact with the Washington Chapter of the Wildlife Society (WA-TWS). The WA-TWS is interested in replicating the successfully completed effort by the Non-lead Hunting Education Program and OR-TWS, including ammunition testing for a multiple-day event. Several presentations have also been completed with Oregon Zoo “Animal Talker” volunteers, helping to increase knowledge and engagement within the on-grounds messaging. Additionally, the “Eco-team” of Oregon Zoo
volunteers has been engaged in assisting at displays on Oregon Zoo grounds, and has used those opportunities to learn appropriate messaging for wildlife lead exposure and ammunition. This has resulted in well trained volunteer staff with the ability to increase messaging without the coordinator needing to be present, magnifying the outreach potential on important educational days (e.g. International Vulture Awareness Day). The trained volunteers are also crucial in providing support during high volume outreach events, such as the display booths at sportsmen’s shows. Training opportunities have also been provided for regional ODFW staff, increasing their ability to adequately discuss wildlife lead exposure and non-lead ammunition during interactions with stakeholders.

**General Public and On-grounds Zoo Messaging**

Another important aspect of the outreach efforts is crafting a consistent educational message for the public audience at the Oregon Zoo. This includes educational brochures, posters, presentation templates, interpretive graphics and online and media releases, developed in collaboration with Oregon Zoo’s communications and education divisions. The message about non-lead ammunition will be incorporated into appropriate events at the zoo including International Vulture Awareness Day. Annual attendance at the Oregon Zoo was over 1.6 million people during the 2016 calendar year. If educational messaging can be expected to reach at least 1% of attendees, that will result in 16,000 individuals exposed to wildlife and lead ammunition messaging. A recent intercept survey showed that 40% of attendees at the Oregon Zoo either hunt with a firearm or have close relatives or friends who do. In the same survey of Oregon Zoo visitors, 55% of visitor groups were either not aware or unsure about the existence of alternatives to lead ammunition. Educational messaging at the Oregon Zoo therefore has the opportunity to directly reach up to 6,000 directly invested stakeholders per year. The educational messaging will also be distributed to other partners (including the recently re-invigorated Pacific Northwest Zoo and Aquarium Alliance) wishing to dispense information about wildlife and lead ammunition, allowing for a consistent region-wide educational effort. Another aspect will be creating social and traditional media presence that continues to inform both the general public and ammunition users (hunters and landowners).

On-grounds messaging was an important aspect of the second year of the program. As the program gained recognition within the zoo administration staff, requests were made to incorporate non-lead hunting education into events developed on grounds. In particular, display booths were requested for Twilight Tuesdays, Endangered Species Day, International Vulture Awareness Day and Halloween events. Specific on-grounds education efforts reached a total of 824 individuals, including at least 62 self-identified hunters. Contact with hunters on zoo grounds was uniformly positive, with many of them having already switched to non-lead. A large number of guests were also either related to or friends with hunters and took information to share. Another 29 contacts were made via a tour of grounds with local city councilors and a meeting with Lego Robotics team “Robohawks.” Interpretive exhibits at the California Condor exhibit are estimated to also reach a portion of visitors who come to the Oregon Zoo. The Non-lead Hunting Education program has also assisted High Desert Museum in developing plans for updated interpretive exhibits for their raptor area. This included review of research, outreach techniques, and some concepts for designing interpretive graphics to maximize appeal and impact.
A program specific web page was developed within the Oregon Zoo website (www.oregonzoo.org/non-lead) and completed in September 2017. This has provided a consistent source of information about the Non-lead Hunting Education Program, with 434 page views since created. Other media was created to help reach out to the public, including an article in the Roseburg News-Review prior to a presentation to the Umpqua Valley Audubon Society, and a follow-up editorial in March 2016. Several other news organizations have reached out for information, and articles have been published by the East Oregonian and www.ensia.com. Finally, a detailed article was written and published for the MIT online magazine Undark (www.undark.org). The reporter conducted an in depth interview and attended the ammunition testing day at Eagle Cap Shooting Association Range in August.

Figure 4: Zoo Volunteers Talk With Zoo Guests on International Vulture Day

The Oregon Zoo received a total of 1,600,713 visitors between February 2, 2016 & February 1, 2017. Conservatively estimating that one percent of guests are exposed to non-lead messaging, a total of 16,000 guests learn about lead exposure in wildlife from ammunition. Additionally, the past intercept surveys indicate that approximately 6,400 of those guests are ammunition users whose decisions on ammunition choices may shift due to information learned at the OR Zoo.
Ammunition Retailer Non-lead Displays

Retailers of non-lead ammunition currently tend to organize sales by caliber, grouping lead and non-lead ammunition together. This makes finding non-lead ammunition difficult for stakeholders and may lead to purchasing of lead ammunition due to difficulty in identifying non-lead ammunition. By working with retailers to separate non-lead ammunition into distinct displays, stakeholders will easily be able to identify and purchase the ammunition.

Direct interaction with retailers has again been limited during this program year. Instead, focus has been directed at local consumers, and creating demand within the community. Efforts have been made in directing consumers to request access to non-lead ammunition from their local retailers. Members of local hunter conservation groups are often employees or owners at local stores, and presentations offer an opportunity to learn about available options. At presentations in September and January, employees or owners of local retailers took information on non-lead ammunition options after presentations.

Western Region Outreach Program Coordination

There are at least four programs that conduct non-lead ammunition outreach with hunters in California, Arizona, Utah and Wyoming. Previous efforts have attempted to coordinate the separate outreach efforts, but without consistent leadership those efforts devolved to simply sharing basic information, and ultimately collapsed. The Oregon Zoo is in a position to assist with the coordination of these separate efforts to maximize effectiveness by helping to maintain consistent and targeted communication between programs. Coordinated efforts include creating effective outreach tools, developing new techniques, identifying key messaging components and sharing workload in developing resources for stakeholders. The coordination of these efforts also creates a network of experts to assist in finding solutions to complex issues. This resource may also be crucial in assisting the development of new programs in areas that until now have seen little or no education on lead ammunition and its effects on wildlife. This effort will greatly assist in addressing all barriers at a much larger scale than would be possible for each program individually.

Several meetings were held throughout 2016 with regional outreach coordinators. Coordination efforts allowed the staffing of a booth at the Backcountry Hunters and Anglers Rendezvous, which would have not been possible by the programs individually. Opportunities for coordination continue to present themselves, including workshops at the International Hunter Education Association conference and developing outreach training for new programs. Cooperative efforts from the regional outreach programs have also focused on improving messaging materials to increase the ability of new programs to provide consistent information with materials that have been implemented and ground tested within current programs. Also, increased effort has been focused on developing better strategies for targeting outreach to develop highest impact on behavior change. Those include developing mapping efforts to track outreach events, increasing use of evaluation within outreach programs, and consistent feedback from outreach programs on successes and failures. There have also been efforts to develop goals for particularly important events that representatives of the non-lead reduction effort attend. This helps to focus productivity at these events away from simple standard messaging to increase targeting messaging to stakeholders.
Zumwalt Prairie Preserve Incentive Program

Relationships developed during the first project year resulted in a unique opportunity during this second year of the project. A portion of the greater Zumwalt prairie in northeast Oregon, the Zumwalt Prairie Preserve (ZPP) is owned and operated by the Nature Conservancy (TNC). This area is home to elk populations that are significantly above management objectives, and result in overgrazing of aspen and shrubs, reducing habitat objectives for the ZPP. Working with ODFW, TNC allows extensive access to the property for elk hunters to accomplish elk herd reductions. For the last several years, TNC has requested that hunters on their property use non-lead ammunition, and has seen slight compliance with 29% of hunters in 2015 choosing to use non-lead ammunition. By developing a partnership between TNC, ODFW, Oregon Zoo and OHA, a program was designed to incentivize more hunters on the ZPP to use non-lead ammunition. ODFW supplied some funding to provide prizes that any hunter using non-lead ammunition would be entered to win. The drawing will be held during the Union-Wallowa OHA Banquet in 2017, providing support from the hunting community for the project. In addition to confirming hunters accessing the property were using non-lead ammunition, a survey was given to non-lead users to identify the factors most influential in their decision to do so. For the 2016 hunting season, the use of non-lead ammunition increased to 45%. Of those using non-lead, 49% were using it for the first time. The majority of non-lead users identified the request from TNC to use non-lead as their main reason for choosing to use non-lead for the hunt (37%). Preventing lead exposure in wildlife (20%), bullet performance (17%), and preventing lead fragments in meat (16%) were the next most common reasons for choosing to use non-lead ammunition. Entry into the raffle was the second to last reason that hunters decided to use non-lead ammunition (6%), with “other” being the final reason (2%).

The decision making process by hunters highlighted through this effort coincides with findings from AZ, where requests from Arizona Game and Fish Department was a major reason hunters chose to utilize non-lead ammunition in their hunts. This continues to show the impact of requests from management agencies and land owners, even without binding regulation, in influencing positive conservation actions from stakeholders.

Oregon Hunter Education

A request from the Oregon Hunter Education Coordinator resulted in the addition of non-lead ammunition information being added to every hunter education packet for 2016. This included a single double-sided sheet detailing the exposure pathway for wildlife to consume lead fragments from ammunition and the common ammunition types available in non-lead. The sheet also included links to huntingwithnonlead.org. A total of 4,000 students went through hunter education in Oregon in 2016, and were given the educational sheet on wildlife lead exposure.

EVALUATION

Evaluation was identified as critical early in the development of the program. It is an aspect that has been missing from similar outreach programs. Working with New Knowledge Ltd. we have developed and begun to implement an evaluation plan that measures program implementation and impacts (see appendix a). Throughout the development of the evaluation plan, instruments were also developed and tested, most notably the paper pre- and post-surveys and the online survey instruments.
Methods

Evaluation efforts are dynamic and responsive to both feedbacks from the field and within the program and analysis efforts. Those efforts have identified changes needed within survey forms to create cross platform (paper and online surveys) consistency. With those adaptations, the ability to use both methods has increased the applicability of the surveys as an evaluation tool. Work with New Knowledge Ltd. was completed in summer of 2016, and evaluation analysis techniques have been identified and implemented (appendix A). In particular, the ability to assess current proportion of non-lead use across five classes of hunting (big game, waterfowl, upland bird, unprotected mammals, and furbearers) provides a critical metric in evaluating ammunition use. Current use can be analyzed across years to investigate outreach impacts, as well as comparisons to intended behavior to examine the outreach effectiveness.

Initial paper surveys were distributed during the Non-lead Hunting Workshop held in November 2015. The survey consisted of a pre- and post-survey using the last 3 digits of the individuals’ phone number to match responses for entry. During the 2016 Sport’s show season, business cards with the Non-lead Hunting Education Coordinator’s contact information were given out. The cards also had an invitation to “Share your thoughts on ammunition choices” with a link to an online survey. Emails from interested attendees were also gathered and a request for participation in the survey was sent following the conclusion of the sport’s show season, in March 2016. Additional survey effort was used during various events including pre/post surveys where appropriate, business cards with invitation to participate in online surveys, and post-only surveys. Behavioral information is asked in the initial section of the survey including ZIP code of residence, number of years hunting, current types of game hunted, type of ammunition used for each type of game, caliber or gauge most often used, and where ammunition is commonly purchased. A second section evaluates knowledge/belief levels on eight components, using a 5-point scale ranging from 1-Strongly Disagree to 5-Strongly Agree. All survey methods included both current game types hunted, with what type of ammunition material (lead or non-lead), eight component of knowledge/belief, and likelihood of using non-lead ammunition for various game types in the future. Analysis of survey responses is conducted using R program.

Results

Total response numbers remain low and limit statistical analysis, but a review of the summary data provides some useful feedback. Examining responses from the first year of outreach, we can identify that within the complete surveys (N=43) 60% of respondents use non-lead ammunition for at least one class of hunting, with 42% of respondents using non-lead ammunition for 100% of the hunting they do. The feedback from the first year of survey data was almost exclusively gathered from the Non-lead Hunting Workshop, with high attendance by agency biologists, and so is likely not indicative of the general population of hunters. In contrast, for the second year of outreach, survey response was across a wider area and contacted a broader diversity of the hunting public, and likely represents a more representative sample of hunters that attend outreach events. Of those responses, 58% of complete surveys (N=83) indicate that non-lead is used for at least one class of hunting but only 2% of those currently use non-lead ammunition for all types of game they pursue (Figure 5). However, in looking at future intended behavior after outreach during the second year, 89% of hunters who responded to...
questions about intended ammunition choices for different game types (N=53) were considering using non-lead ammunition for at least a portion of the game they hunt and 40% were considering using non-lead ammunition exclusively for all types of game they hunt (Figure 6).

Figure 5: Non-lead Hunting Education Evaluation

![Year 2 Current Non-lead Use (Complete Responses) Pie Chart]

Figure 6: Non-lead Hunting Education Evaluation

![Year 2 Intended Non-lead Use After Outreach (Complete Responses) Pie Chart]

More clearly illuminating the impact of outreach on intended behavior is the use of matched pre- and post-outreach surveys. Although these types of survey responses are especially limited (N=34) these
clearly indicate the shift in intended behavior. Prior to outreach 17% of respondents use non-lead ammunition for 100% of the game types that hunted (Figure 7).

Figure 7: Pre-Survey Responses

Post outreach, 47% said they were likely or extremely likely to use non-lead ammunition for every type of game that they hunted. Additionally, the number of hunters that said they would not use any non-lead ammunition dropped by nearly half, from 17% currently using all lead ammunition, to only 9% unwilling to use any non-lead ammunition in the future (Figure 8).

Figure 8: Post-Survey Responses
**BUDGET**

**Oregon Zoo Foundation:**

The Oregon Zoo Foundation provided the major funding for both salary and project funds. Additional funds were provided through a donation from the Betty Curchin Memorial Fund and the award of an Advancement Grant.

Table 3: OZF

<table>
<thead>
<tr>
<th>Projected Expenditure</th>
<th>Year 1 Funding</th>
<th>Year 1 Expenditures</th>
<th>Year 2 Funding</th>
<th>Year 2 Expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payroll</td>
<td>$72,534.00</td>
<td>$61,203.00</td>
<td>$77,035.00</td>
<td>$49,896.82</td>
</tr>
<tr>
<td>Travel</td>
<td>$2,500.00</td>
<td>$997.40</td>
<td>$5,000.00</td>
<td>$2,707.51</td>
</tr>
<tr>
<td>Supplies &amp; Operating Expenses</td>
<td>$5,000.00</td>
<td>$2,407.71</td>
<td>$2,500.00</td>
<td>$1,098.37</td>
</tr>
<tr>
<td>Advancement Grant</td>
<td>N/A</td>
<td>N/A</td>
<td>$1,000.00</td>
<td>$249.99</td>
</tr>
<tr>
<td>Betty Curchin Memorial Fund</td>
<td>N/A</td>
<td>N/A</td>
<td>$3,000.00</td>
<td>$3,000.00</td>
</tr>
<tr>
<td>Equipment</td>
<td>$2,000.00</td>
<td>$1,906.57</td>
<td>$1,000.00</td>
<td>$0.00</td>
</tr>
</tbody>
</table>

**United States Fish & Wildlife Service:**

The USFWS provided $20,000 for salary each year. An additional source of funding for supplies and operating expenditures was granted in April of 2015 to cover projected operating expenses for 2 years.

Table 4: US Fish and Wildlife Service

<table>
<thead>
<tr>
<th>Projected Expenditure</th>
<th>Total funding</th>
<th>Year 1 Expenditures</th>
<th>Year 2 Expenditures</th>
<th>Remaining Funds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payroll</td>
<td>$60,000.00</td>
<td>$20,000.00</td>
<td>$20,000.00</td>
<td>$20,000.00</td>
</tr>
<tr>
<td>Testing</td>
<td>$1,150.00</td>
<td>$3,451.53</td>
<td>$44.98</td>
<td>$436.86</td>
</tr>
<tr>
<td>Shooting Demonstrations</td>
<td>$16,310.00</td>
<td>$664.52</td>
<td>$17.80</td>
<td>$12,831.35</td>
</tr>
</tbody>
</table>

**AZA Conservation Grant Fund:**

The Non-lead Hunting Education Program applied for the AZA CGF grant in February 2015 and was awarded the grant in September of 2015. The funds are available for one year after disbursement and funding was received in December 2015. An extension was filed for an additional year ending the AZA CGF funding support in September 2017.
Table 5: AZA Conservation Grant Fund

<table>
<thead>
<tr>
<th>Projected Expenditure</th>
<th>Total funding</th>
<th>Year 1 Expenditures</th>
<th>Year 2 Expenditures</th>
<th>Remaining Funds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment</td>
<td>$655.00</td>
<td>$0.00</td>
<td>$213.59</td>
<td>$441.41</td>
</tr>
<tr>
<td>Travel</td>
<td>$6,083.00</td>
<td>$1,608.43</td>
<td>$4,462.65</td>
<td>$11.92</td>
</tr>
<tr>
<td>Shooting Demonstrations</td>
<td>$8,175.00</td>
<td>$0.00</td>
<td>$1,094.73</td>
<td>$7,080.27</td>
</tr>
<tr>
<td>Event Fees</td>
<td>$2,200.00</td>
<td>$2,100.00</td>
<td>$100.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Display Materials</td>
<td>$425.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$425.00</td>
</tr>
</tbody>
</table>

Private Donation

In June of 2015, a private individual decided to assist in funding the program and donated $5,000 to cover gaps in funding between project initiation and receipt of other funding sources. These funds were crucial in purchasing materials vital to the development of program objectives and continue to be vital to fill gaps left by other funding sources.

Table 6: Private Donation

<table>
<thead>
<tr>
<th>Projected Expenditure</th>
<th>Total funding</th>
<th>Year 1 Expenditures</th>
<th>Year 2 Expenditures</th>
<th>Remaining Funds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplies and Operating</td>
<td>$5,000.00</td>
<td>$1,915.01</td>
<td>$2,480.60</td>
<td>$604.39</td>
</tr>
<tr>
<td>Expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SUMMARY

The second year of the Non-lead Hunting Education Program was a great continuation of the foundation laid during the initial years’ efforts. With the continued building of relationships with stakeholder groups and agencies, outreach exceeded expected levels. Additionally, the close relationships with a variety of stakeholders allowed for the creation of innovative efforts to increase both the use of non-lead ammunition and understanding of the Non-lead Hunting Education Program as a resource for the hunting community. This was also facilitated by renaming the program to more clearly represent the program goals and reduce confusion.

The second program year was extremely busy, with 63 total outreach events conducted. These included 22 presentations to stakeholder groups three times the planned number, interacting with 600 individuals. Continued collaboration with Oregon Hunter’s Association helped to drive an increase in opportunities to give presentations to local chapters (seven presentations to 160 individuals). The presentations were also used as a way to build interest within local communities for opportunities to test non-lead ammunition. Although ammunition testing events were limited, the increased interest in opportunity raises the likelihood of success during the third year of the program. In addition to raising interest at presentations, display booths at sportsmen’s shows and other venues presented opportunities to talk with members of local communities and build interest in ammunition testing days.
Educational display booth events were held for 30 outreach days, reaching 5,514 individuals. The majority of display booth days and contacts were associated with the Sportsmen’s show circuit held in February of each year. A number of booth days were also conducted on zoo grounds (7 booth days, reaching 814 direct contacts), providing opportunities for guests to learn more in depth about the issue. Previous on ground survey efforts have identified that a large portion of guests have connections with the hunting community. In addition, building public knowledge about the issue may result in support as efforts to increase opportunities to reduce wildlife lead exposure continue. Partnership with Oregon Hunter Education also created education opportunities for the next generation of hunters, a crucial group of stakeholders.

There was only a single ammunition testing event held at the Eagle Cap Shooting Association Range in Enterprise, OR. Although poorly attended, it provided additional opportunities to interact with members of what is expected to be one of the more difficult regions to provide opportunities to hunters. In addition, it was within the communities closest to Zumwalt Prairie Preserve, and gave a chance for local hunters who take advantage of those management hunts to test non-lead ammunition in order to participate in the Zumwalt Prairie Preserve Incentive program. Finally, this event was attended by Lynne Peeples, a reporter writing an in depth story on lead exposure in wildlife, which was released via Undark Magazine (https://undark.org/article/lead-ammunition-bullets-hunting-copper/).

Numerous other articles on lead ammunition impacts on wildlife have been published, including editorials by the Non-lead Hunting Education Program. The direct impacts of these are difficult to quantify, but they have been raised in conversations with stakeholders multiple times, illustrating the effectiveness of developing a source of material that assists in developing conversations around the issue. Headlines of these articles are highlighted in Appendix A.

Discussions with The Nature Conservancy (TNC) staff at Zumwalt Prairie Preserve identified an opportunity in spring of 2016. After reaching out to other potential partners a decision was made to initiate an incentive program in partnership with TNC, Oregon Department of Fish and Wildlife (ODFW), and Oregon Hunter’s Association (OHA). This resulted in a request from TNC for hunters on their property to use non-lead ammunition, and additionally providing some opportunity for reward for those who complied with that request during the 2016/2017 seasons. ODFW was able to provide some funding for incentive prizes for those who used non-lead ammunition, and OHA provided a venue to draw the rewards as a third party. Although TNC had been requesting hunters use non-lead ammunition on their property for several years, the increased marketing around the incentive program, in conjunction with the potential for reward, resulted in a marked increase in the number of hunters using non-lead ammunition. There is hope that this effort will be a model that can be expanded across the state to encourage the use of non-lead ammunition. Participation of landowners making a request for hunters to use non-lead ammunition with permission to access property appears to be a very powerful incentive for behavior change.

The effort to develop evaluation methodologies continued through the second program year. After initial work on evaluation, continued effort was made to implement described evaluation methods, as well as developing analysis. Analysis efforts provided feedback into methodology that allowed for adaptation of the evaluation tools to be more effective in gathering needed data, as well as easier to
implement while conducting outreach. Although sample sizes remain small there is some evidence that outreach is having impacts on intended behavior. Prior to outreach only 15% of contacts used non-lead ammunition for all types of hunting they conducted. Following outreach 40% of contacts indicated they intended to use non-lead ammunition for all types of hunting. Of the 43% who said they currently do not use any non-lead ammunition for any type of hunting only 11% said they were unlikely to use nonlead ammunition for any type of hunting in the future. Continued outreach with evaluation efforts will more easily document potential changes within the community. Progression of the evaluation effort across a larger time scale will provide more opportunity to compare shifts in behavior that indicate a reduction in lead available to scavenging wildlife.

Increasing effective evaluation has also been a focus of the continued collaboration between the Non-lead Hunting Education Program and outreach programs across the greater region. Leadership of many of the programs have continued to work together to develop materials and messaging. During the end of 2016, progress was made with The Peregrine Fund in deciding to more formally pursue collaborative programs, and plans have begun to take shape. The hope is that this will allow efforts in various states to continue as needed individually, but also provide support to those efforts and power for discussions with larger national groups.

The program is entering the final year of funding through the original grant process, and there is significant need to identify future funding sources. The success of the Non-lead Hunting Education Program is high, and has developed good relationships with a number of respected stakeholder groups. Pressure continues to mount on agencies to develop strategies to manage lead exposure in wildlife, and in Oregon the expected release of California Condors in Northern California plays a powerful role. Additionally, recent political activities have raised the use of lead in hunting ammunition to the forefront of the public’s collective consciousness, increasing pressure on agencies to develop effective plans. Working with a diverse group of stakeholders including USFWS, ODFW, OHA and Portland Audubon Society, the Non-lead Hunting Education Program is assisting in drafting a plan for Oregon that will address the issue, while maintaining support from both hunting and non-hunting conservationists. Behavior change around this and many other issues must be considered a long term endeavor, and adequate funding will continue to be a challenge. The first two years of this program have laid a solid foundation for both continuing the program and reducing lead exposure in wildlife.
# Evaluation Summary

<table>
<thead>
<tr>
<th>Outreach Event</th>
<th>Evaluation Measurement</th>
<th>Accomplishment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signatory Support of a Coalition Agreement</td>
<td>Finalize Coalition Agreement</td>
<td>• Agreement in Draft form (see discussion on pages 5 and 6)</td>
</tr>
<tr>
<td></td>
<td>Count signees</td>
<td>• N/A</td>
</tr>
<tr>
<td></td>
<td>Telephone interview with leaders: 10 minutes guided conversation</td>
<td>• N/A</td>
</tr>
<tr>
<td></td>
<td>Website traffic</td>
<td>• N/A</td>
</tr>
<tr>
<td>Presentations at stakeholder gatherings</td>
<td>Number of new signatures to NW Sportsmen Personal Pledge</td>
<td>• Personal Pledge Drafted</td>
</tr>
<tr>
<td></td>
<td>Paper Surveys</td>
<td>• 58 Surveys Returned</td>
</tr>
<tr>
<td></td>
<td>Number of completed online surveys from presentations</td>
<td>• 2 Online Survey Completed</td>
</tr>
<tr>
<td></td>
<td>Total number of attendees</td>
<td>• 603 individuals</td>
</tr>
<tr>
<td>Educational display at Sportsmen’s Shows</td>
<td>Counts of attendees actively interacting with booth staff</td>
<td>• 5514 individuals</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 226 currently using non-lead ammunition</td>
</tr>
<tr>
<td></td>
<td>NW Sportsmen Personal Pledge</td>
<td>• No interest from stakeholders in signing Personal Pledge</td>
</tr>
<tr>
<td></td>
<td>Dot Surveys</td>
<td>• 269 responses</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 89% willing to try non-lead ammunition</td>
</tr>
<tr>
<td></td>
<td>Online Survey</td>
<td>• 35 responses</td>
</tr>
<tr>
<td>Shooting Demonstrations</td>
<td>Paper survey</td>
<td>• 3 completed surveys from Eagle Cap event</td>
</tr>
<tr>
<td></td>
<td>Online survey</td>
<td>• Online Survey Completed</td>
</tr>
<tr>
<td></td>
<td>NW Sportsmen Personal Pledge</td>
<td>• N/A</td>
</tr>
<tr>
<td></td>
<td>Count number of attendees</td>
<td>• 8 individuals</td>
</tr>
<tr>
<td>Training Educators and Staff</td>
<td>Count number of attendees</td>
<td>• 3 staff at Condor Breeding Facility</td>
</tr>
<tr>
<td></td>
<td>Paper Pre- and Post-Survey of training attendees</td>
<td>• N/A</td>
</tr>
<tr>
<td>General Public and On-grounds Zoo Messaging</td>
<td>Intercept Surveys (Support from education staff and Volunteers)</td>
<td>• N/A</td>
</tr>
<tr>
<td></td>
<td>Online survey</td>
<td>• N/A</td>
</tr>
</tbody>
</table>
### Appendix A: Evaluation Details

<table>
<thead>
<tr>
<th>Category</th>
<th>Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Annual visitor Attendance</strong></td>
<td>• Approximately 1.6 million visitors&lt;br&gt;  o Estimated 10% exposed to non-lead messaging during regular zoo visits: 16,000 individuals</td>
</tr>
<tr>
<td><strong>Special Event Messaging</strong></td>
<td>• Count visitor attendance to events from organizer&lt;br&gt;  • In the event of an educational display treat as a sportsmen’s show booth for evaluation purposes</td>
</tr>
<tr>
<td><strong>Zoo online presence</strong></td>
<td>• Track Facebook visitor engagement with non-lead outreach posts&lt;br&gt;  (number of likes, shares, comments)&lt;br&gt;  • 434 page visits to Non-lead Hunting Education page on Oregon Zoo website (oregonzoo.org/non-lead)</td>
</tr>
<tr>
<td><strong>Ammunition Retailer Non-lead Displays</strong></td>
<td>• Visits to stores in various areas around state&lt;br&gt;  • No stores display non-lead ammunition separately&lt;br&gt;  • Limited selection of non-lead ammunition available&lt;br&gt;  • Not started</td>
</tr>
<tr>
<td><strong>Interview retail staff (what is non-lead ammo? Brands and models?)</strong></td>
<td>• None currently interested in providing separate sections for non-lead ammunition</td>
</tr>
<tr>
<td><strong>Number of stores approached, Number using separate non-lead bullet displays</strong></td>
<td>• 4 meeting throughout second Program Year&lt;br&gt;  • Goals to update outreach materials (brochures &amp; banner stands) completed, update of huntingwithnonlead.org begun&lt;br&gt;  • Collaborative process begun</td>
</tr>
</tbody>
</table>

### Western Region Outreach Program Coordination

- **Telephone Interviews with Program leaders**<br>  • Consistent contact with outreach programs in CA & AZ.<br>  • Sharing outreach materials
- **Non-lead Outreach Coordinator Meeting**
Choose non-lead for a clean kill

Leland Brown Guest Column  Apr 5, 2016

In a recent program for the Umpqua Valley Audubon Society, I discussed the unintended consequences of using lead ammunition.

Although there were a number of attendees, it seems that many hunters were not able to attend, and did not have an opportunity to talk about the issues that concern them.

With that in mind, I’d like to give more information about that presentation’s goal: to provide an opportunity for both the hunting and non-hunting conservation communities to learn about a recognized conservation issue and discuss ways to help minimize any unintended impacts.
Hunters slowly switching from lead ammunition

PENDLETON, Ore. (AP) — Scott Peckham remembers the moment he decided to switch from lead ammunition to copper.

Peckham, big game ecologist for the Confederated Tribes of the Umatilla Indian Reservation and a hunter, had just dug into a plate of venison spaghetti when he bit into a hard object.

“It was a large lead fragment about half the size of a raisin,” Peckham said. “It was a sizable chunk of bullet in my mouth and I crunched it.”

He laid his fork down.

Lead is highly toxic. Knowing this, Peckham had carefully cut out the bloodshot portion of the deer while butchering and thought he had gotten all the bullet fragments before grinding it and using some of the burger for the spaghetti sauce. The health-minded Peckham finds the idea of eating hormone- and antibiotic-free game appealing and the possibility that he and his wife were ingesting lead bothered him. After the spaghetti episode, Peckham stocked up on non-toxic copper bullets for his next hunting trip.

Figure 10: East Oregonian article July 2016:
IF LEAD AMMUNITION IS BAD FOR PEOPLE AND THE ENVIRONMENT, WHY DO WE STILL USE IT?

Concerns about regulation, skepticism about the science and misperceptions about costs are slowing the transition to nontoxic alternatives.

July 7, 2016 — Andrea Goodnight knows firsthand what lead poisoning looks like. A veterinarian at the Oakland Zoo, Goodnight treats endangered California condors when testing shows dangerous levels of the toxic metal in their blood.

If blood lead levels get too high, condors, eagles and other
Figure 10: UnDark Magazine Article January 2017

Lead ammunition poses real risks. Why won’t gun owners switch?

CASE STUDIES / News & Features

Bullet Proof

Lead bullets still dominate the U.S. ammunition market despite ample evidence showing that they pose real environmental and health risks. Why?

01.30.2017 / BY Lynne Peeples / 11 COMMENTS

"YES AND EARS," Leland Brown calls out. "We’re going hot!" We pull on our safety glasses and earmuffs, though neither prevents the concussive blast to our chests as Jeff Yanke pulls the trigger of his Ruger M77 rifle, sending a bullet coursing towards the back end of a 50-gallon rain barrel.

The white plastic drum, flanked by a menagerie of more traditional steel targets depicting a coyote, a chicken, and a pig rests horizontally on a wooden cradle 100 yards downrange. A round hole is cut into its bottom, which faces Yanke, and inside the barrel are five plastic, one-gallon jugs. Each jug is filled with water and arranged in a line, from front to back, ready to absorb the incoming round — a crude but effective enough proxy for the dense hide of a game animal.
Appendix C: Outreach Event Map

Figure 13: Locations of Non-lead Outreach Events Held from February 2, 2016-February 1, 2017
Citations


Citations
