CITIZEN PETITION FORM

Date: June 3, 2026

Issue: PETITION TO BAN THE USE OF LEAD-BASED AMMUNITION FOR HUNTING IN COLORADO

Which rule are you seeking to create or revise? Please include a copy of the rule you are proposing to create or change, preferably with the change made in redline format.

Petitioners seek a revision to 2 CCR § 406-0-Chapter W-O-General Provisions as follows:

Add the following definitions to **Article I - DEFINITIONS (§ 2 CCR 406-0-000)**

1. **"Ammunition"** means any cartridge or projectile designed to be fired from a firearm, including handguns, rifles and shotguns.
2. **"Lead ammunition"** means ammunition that contains lead projectiles or lead within the projectile in excess of one percent (1%) by weight.
3. **"Nonlead ammunition"** means ammunition containing projectiles certified to contain one percent (1%) or less lead by weight, or that otherwise meet criteria approved by the Parks and Wildlife Commission.
4. **"Take"** has the same meaning as defined at Section 33-1-102, C.R.S.

Add a new subsection G to **Article IV - MANNER OF TAKING WILDLIFE (§ 2 CCR 406-0-004)**

1. Prohibition

a. Except as provided in subsection (2), it is unlawful to possess lead ammunition and a firearm capable of discharging that ammunition while taking or attempting to take wildlife.

b. This prohibition applies statewide on lands where Parks and Wildlife has authority to enforce laws and regulations.

2. Exceptions.

a. Possession of lead ammunition in a firearm for personal protection, where the firearm is not being used for the take of wildlife, shall not constitute a violation.

b. Temporary exemptions may be granted by the Director for specific calibers or seasons if the Commission makes a finding that nonlead ammunition is not commercially available, subject to Commission rules.

3. Certification.

a. The Division shall maintain a list of approved nonlead projectiles and ammunition, and criteria for certification shall be established by the Commission.

b. Shotgun ammunition containing pellets composed of materials approved as nontoxic by the U.S. Fish and Wildlife Service is considered certified.

4. **Enforcement and Penalties.**
   Violation of this section is a violation of these regulations and subject to penalties as provided in Title 33, C.R.S., and by Commission rule.

Why are you seeking to create or revise this rule? Please include a general statement of the reasons for the requested rule or revision and any relevant information related to the request.

This Petition is being submitted pursuant to the Colorado Wildlife Act, C.R.S. §§ 33-1-101 *et seq.*, and the Colorado Parks and Wildlife Commission's rulemaking authority under C.R.S. § 24-4-103(7) to protect, preserve, and manage the wildlife resources of the State. Here, the undersigned respectfully petitions the Commission to initiate rulemaking to prohibit the use of lead ammunition for the take of wildlife in Colorado. This Petition is grounded in well-established evidence demonstrating that lead ammunition poses a significant and preventable threat to wildlife health, ecosystem integrity, and public trust resources; and that effective, commercially available non-lead alternatives exist. Adoption of a statewide non-lead ammunition requirement is a reasonable, necessary, and lawful exercise of the Commission's duty to safeguard Colorado's wildlife for the benefit of present and future generations.

Please see attached Citizen Rulemaking Petition to Ban the Use of Lead-based Ammunition for Hunting in Colorado and December 2025 Lead Ammunition Report which are fully incorporated into this filing by reference.

Petitioner's names:
Animal Wellness Action
The Center for a Humane Economy
Colorado Voters for Animals
Coalition to Protect America's National Parks
Public Employees for Environmental Responsibility
Arkansas Valley Audubon Society
Black Canyon Audubon Society
Bleating Hearts Sanctuary
Colorado Wild
Colorado Wolf and Wildlife Center
Doggidy Do
Luvin Arms Farm Animal
Rocky Mountain WildHeart Wildlife Rehabilitation Center
Rocky Mountain Wildlife Alliance
Roaring Fork Audubon
San Luis Valley Ecosystem Council
Science for Colorado
Science for Colorado Wildlife

PETITION TO BAN THE USE OF LEAD-BASED AMMUNITION FOR HUNTING IN COLORADO

SUMMARY

This petition is being submitted pursuant to the Colorado Wildlife Act, §§ 33-1-101 et seq., C.R.S., and the Colorado Parks and Wildlife Commission's rulemaking authority under 24-4-103(7), C.R.S. to protect, preserve, and manage the wildlife resources of the State, the undersigned hereby respectfully petitions the Commission to initiate rulemaking to prohibit the use of lead ammunition for the take of wildlife in Colorado. This petition is grounded in well-established scientific evidence demonstrating that lead ammunition poses a significant and preventable threat to wildlife health, ecosystem integrity, and public trust resources, and that effective, commercially available nonlead alternatives exist. Adoption of a statewide nonlead ammunition requirement is a reasonable, necessary, and lawful exercise of the Commission's duty to safeguard Colorado's wildlife for the benefit of present and future generations.

The Colorado Parks and Wildlife Commission ("Commission") is constitutionally, statutorily, and doctrinally obligated to conserve wildlife and safeguard the environment for present and future generations. The Colorado Wildlife Act declares that the wildlife of the state is the property of the state and shall be preserved, protected, enhanced, and managed for the benefit of the people of Colorado, and it charges the Commission with promulgating regulations necessary for the "preservation, protection, enhancement, and management of wildlife resources." §§ 33-1-101, 33-1-104(1), C.R.S. In carrying out this mandate, the Commission must consider ecological integrity and the long-term health of wildlife populations, not merely short-term consumptive use.

Colorado courts have long recognized that wildlife is held by the State in trust for the public, consistent with the public trust doctrine, which imposes an affirmative fiduciary duty on the State and its agencies to prevent avoidable harm to trust resources and to manage them for the common benefit. See *People v. Emmert*, 597 P.2d 1025, 1027 (Colo. 1979); *City of Northglenn v. Grynberg*, 846 P.2d 175, 179 (Colo. 1993).

Together, these constitutional principles, statutory directives, and public trust obligations require the Commission to adopt reasonable regulations that prevent environmental contamination and wildlife mortality, including measures to reduce known toxic threats to wildlife populations.

Given the indisputable evidence that the use of lead ammunition is continuing to have significant detrimental effects on wildlife and the people of Colorado and in recognition of the fact that the Center for Disease Control states that no safe blood lead level in children has been identified, CPW must act to put an end to the unnecessary use of lead bullets by hunters in the state of Colorado.

BACKGROUND ON LEAD AMMUNITION REGULATION IN THE US

Lead is a toxic, non-essential metal that provides no beneficial effects to living organisms. It acts as

a metabolic poison affecting a wide range of physiological and biochemical systems.[1] Lead is pervasive and remains in the environment for decades. There, it can get into the food chain by being taken up by plants and soil microorganisms.[2] Yet, the greatest lead exposure pathway for wildlife is through the direct ingestion of lead-based ammunition and fragments.[3]

Systematic studies of lead poisoning in waterfowl in the mid-20th century found as many as 40 percent of ducks had lead pellets in their gizzards.[4] At the same time, bald eagles and other raptorial species were experiencing population-level impacts from the consumption of tainted waterfowl.[5] Based on these results, the U.S. federal government passed a total ban on the use of lead shot in waterfowl hunting in 1991.

As a result of the 1991 ban, waterfowl populations experienced a 44 percent decline in elevated blood-lead levels.[6] Thanks to the lower lead burdens, waterfowl populations today have experienced a positive rebound from their pre-ban numbers.[7]

During the last days of the Obama Administration in January 2017, the U.S. Fish and Wildlife Service ordered a phaseout of all lead ammunition and fishing tackle in federal lands under its jurisdiction.[8] However, less than two months later, that order was revoked.[9]

In June 2022, the Biden administration initiated a new incremental approach, proposing a phase-out of lead ammunition in just ten wildlife refuges.[10] However, after state officials in West Virginia objected, the administration conceded to drop the phase-out in one of those ten refuges. A coalition of advocacy groups, represented by Earthjustice, sued the FWS for its decision to drop its lead phase-out for that West Virginian wildlife refuge.

States have also taken action to address lead in ammunition. California has implemented one of the most comprehensive lead ammunition bans for hunting in the United States. Under Assembly Bill 711**,** signed into law in 2013**,** the state directed the California Fish and Game Commission to phase in regulations requiring the use of non-lead ammunition—defined and certified by the Commission as containing no more than trace amounts of lead—when taking any wildlife with a firearm. This phased

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1 Deborah J. Pain et al., *Effects of Lead from Ammunition on Birds and Other Wildlife: A Review and Update*, 48 AMBIO 935, 935 (2019), https://doi.org/10.1007/s13280-019-01159-0.

2 LEAD AMMUNITION GROUP, LEAD AMMUNITION, WILDLIFE AND HUMAN HEALTH REPORT (2015), https://www.leadammunitiongroup.org.uk/wp-content/uploads/2015/06/LAG-Report-June-2015-Appendices-without-Appendix-6.pdf.

3 GLEN C. SANDERSON & FRANK C. BELLROSE, A REVIEW OF THE PROBLEM OF LEAD POISONING IN WATERFOWL 7 (1986), http://hdl.handle.net/2142/111642.

4 *Id* at 5.

5 Jeffrey P. Cohn, *Lead Shot Poisons Eagles*, BIOSCIENCE 474, 475 (1985), https://www.jstor.org/stable/1309813?seq=2.

6 Michael D. Samuel & E. Frank Bowers, *Lead Exposure in American Black Ducks After Implementation of Lead Shot*, 64 J. WILDLIFE MGMT. 927, 927 (2000), https://doi.org/10.2307/3803203.

7 *While the Federal Ban on Lead Ammo Is Gone, the Dangers to Birds and People Will Persist*, AUDUBON CAL., https://ca.audubon.org/news/while-federal-ban-lead-ammo-gone-dangers-birds-and-people-will-persist (last visited Oct. 10, 2024).

8 Kitty Block & Sara Amundson, *Lead Poisoning Kills Countless Animals. It Doesn't Have to be This Way*, THE HUMANE SOC'Y OF THE U.S. (Aug. 2, 2024), https://www.humanesociety.org/blog/lead-ammunition-danger-health-wildlife.

9 *Id*.

10 50 C.F.R. § 32 (2022).

implementation culminated on July 1, 2019, when the ban became fully effective statewide**,** making it unlawful to hunt game mammals, game birds, nongame birds, and nongame mammals with traditional lead projectiles anywhere in California. Hunters must use certified non-lead alternatives (such as copper or other non-toxic materials), though limited exemptions exist (for example, possessing lead ammo in a concealable firearm for personal protection, so long as it is not used for hunting). Violations of the law carry fines and potential loss of hunting privileges. The policy aims to protect wildlife—especially sensitive species like the California condor—and public health by reducing environmental lead exposure from spent ammunition.

LEAD AMMUNITION HARMS WILDLIFE

A December report by Animal Wellness Action and the Center for a Humane Economy documents the most recent studies and findings on the problem of lead ammunition used by hunters. We have attached the study to this Petition and are incorporating it into our filing for your consideration.

Lead poisoning in animals from lead ammunition has been recognized for more than one hundred years.[11] Generally speaking, lead poisoning in animals can lead to increased mortality, poor body conditions, behavioral changes, impaired reproduction, and increased susceptibility to infectious diseases and parasites.[12]

Birds are particularly vulnerable to lead poisoning.[13] There are two main ways birds ingest lead: (1) directly ingesting lead ammunition or its fragments, and (2) consuming carcasses containing lead.[14] Chronic exposure to lead causes anemia, lethargy, muscle wastage, wing droop, increased disease susceptibility, loss of balance and coordination, and paralysis in birds.[15] Acute lead exposure can lead to immediate death.[16] Lead fragments as small as a grain of rice are lethal to eagles.[17] Nearly half of all North American bald and golden eagles experience chronic lead poisoning based on bone lead concentrations.[18] This continent-wide lead poisoning will create long-term ramifications for eagle populations as lead accumulates in their bodies as they age.

Studies have shown that wildlife ingest lead from big game hunting. A 2024 study reported lead toxicosis in raptors and corvids that scavenged carcasses white-tailed deer in New York state, with the most harmful effects found in bald and golden eagles.[19] Although birds are the most extensively studied

11 H.S. Calvert, *Pheasants Poisoned by Swallowing Shot*, 47 THE FIELD 189 (1876).

12 RICHARD O. KIMMEL & MOLLY A. TRANEL, EVIDENCE OF LEAD SHOT PROBLEMS FOR WILDLIFE, THE ENVIRONMENT, AND HUMAN HEALTH—IMPLICATIONS FOR MINNESOTA (2007), https://wdfw.wa.gov/sites/default/files/2019-01/Lead_Shot_Problems_Wildlife_Environment_Human_Health_MN.pdf.

13 Pain et al., *supra* note 1 at 936.

14 *Id*.

15 *Id*.

16 *Id*.

17 *Lead Toxicity in Bald Eagles*, AM. EAGLE FOUND., https://eagles.org/lead-toxicity-in-bald-eagles/

18 Vincent A. Slabe et al., *Demographic Implications of Lead Poisoning for Eagles Across North America*, 375 SCIENCE 779, 779 (2022), https://doi.org/10.1126/science.abj3068.

19 Andreas Eleftheriou et al., Vulnerability to Lead Toxicosis and Bioindicator Utility of Deer Scavengers in New York, 88 J. WILDLIFE MGMT. (2024), https://doi.org/10.1002/jwmg.22641.

organisms with regards to lead poisoning from lead ammunition, lead's toxic effects are generally similar for all wildlife.[20]

Mammals are not as exposed to lead as birds due to different feeding habits and the digestive system of birds doesn't allow them to expel non-digestible material as easily as mammals, but they too experience the harmful effects of lead ammunition. As with birds, there are no positive health benefits from lead for wild mammals.[21] Negative health impacts of lead range from interference to tooth development, to damage to nervous, circulatory, and reproductive systems, to death.[22] Elevated levels of lead have been found in several species of small mammals near shooting ranges, including shrews, mice, voles,[23] squirrels, opossums, and raccoons.[24] Lead affects large mammals, too. Data has shown that grizzly bears in the greater Yellowstone ecosystem sampled during hunting season had higher mean blood lead levels than grizzly bears sampled before hunting season had started.[25] Mammals and birds alike experience the negative health impacts from lead exposure due to lead hunting ammunition.

In sum, more than 130 species of animals—including songbirds, game birds, raptors, waterfowl, small and large mammals, and reptiles—have been documented to have lead exposure because of lead hunting ammunition.[26] This prevalent lead exposure is certain to have harmful effects on wildlife.

LEAD AMMUNITION HARMS HUMAN HEALTH

The toxic effects of lead on humans have been known since Roman times.[27] Lead exposure has been documented to damage every human organ system.[28] Lead poisoning in humans can result in damage to the brain and central nervous system; kidney disease; high blood pressure; anemia; damage to the reproductive system including but not limited to sterility; painful gastrointestinal symptoms; loss of appetite; weakness and dehydration; nerve disorders; memory and concentration problems; and muscle and joint pain.[29] In isolated large doses, lead exposure can lead to all of the above as well as coma and

20 Pain et al., *supra* note 1 at 936.
21 Helle B. Hydeskov et al., *A Global Systematic Review of Lead (Pb) Exposure and its Health Effects in Wild Animals*, 60 J. WILDLIFE DISEASES 285, 289 (2024), https://doi.org/10.7589/JWD-D-23-00055.
22 *Id.* at 292.
23 W.C. Ma, *Effect of Soil Pollution with Metallic Lead Pellets on Lead Accumulation and Organ/Body Weight Alterations in Small Mammals*, 18 ARCHIVES ENV'T CONTAMINATION AND TOXICOLOGY 617 (1989), https://doi.org/10.1007/BF01055030.
24 L.A. Lewis et al., *Lead Toxicosis and Trace Element Levels in Wild Birds and Mammals at a Firearms Training Facility*, 41 ARCHIVES ENV'T CONTAMINATION AND TOXICOLOGY 208, 210 (2001), https://doi.org/10.1007/s002440010239.
25 Thomas A. Rogers et al., *Lead Exposure in Large Carnivores in the Greater Yellowstone Ecosystem*, 76 J. WILDLIFE MGMT. 575, 578 (2011), https://doi.org/10.1002/jwmg.277.
26 MOLLY A. TRANEL & RICHARD O. KIMMEL, IMPACTS OF LEAD AMMUNITION ON WILDLIFE, THE ENVIRONMENT, AND HUMAN HEALTH—A LITERATURE REVIEW AND IMPLICATIONS FOR MINNESOTA (2008), https://science.peregrinefund.org/legacy-sites/conference-lead/PDF/0307%20Tranel.pdf.
27 Stata Norton, *Lead and Lead Poisoning in Antiquity*, 309 NEW ENG. J. MED. 864 (1983), https://doi.org/10.1056/NEJM198310063091422.
28 AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY, TOXICOLOGICAL PROFILE FOR LEAD (2020), https://www.atsdr.cdc.gov/ToxProfiles/tp13.pdf.
29 *Id*.

death.[30] Importantly, lead poisoning may show no signs or symptoms until well after dangerous quantities have accumulated in the body and irreversible damage has already occurred.[31]

Pregnant women and young children are particularly vulnerable to lead exposure.[32] In the United States, the regulation of lead in consumer products and elsewhere has diminished or eliminated the levels of lead in various sources (e.g., paint, gasoline, children's toys, and more). However, little regulatory attention has been paid to the lead exposure that occurs through hunting or fishing.

Hunters who use lead bullets are at risk of lead poisoning. Inhaling airborne lead particles from gun smoke and handling lead residues are commonly recognized risks for lead exposure.[33] However, eating lead-contaminated meat has garnered considerably less attention, despite scientific evidence showing a positive correlation between eating hunted game and elevated blood-lead levels.[34]

When a lead bullet strikes an animal, it fragments into hundreds of tiny fragments that travel as far as one foot from the bullet wound.[35] One Pennsylvania deer processor said, "[s]eventy-five percent of the time when I find a bullet in the carcass, I only find the base. I know the lead is all in the meat somewhere."[36]

Even when hunters think they have removed all of the lead during butchering, microscopic fragments of residual lead are impossible to remove completely. The blog Outdoor Life describes looking at hunter-killed venison under a high-definition CT scan: "Under the x-ray, it looked like somebody had sprinkled black pepper all over the carcasses, only the black flakes were lead, not pepper."[37]

In contrast, non-lead ammunition, such as those made from copper and copper-zinc alloys, does not fragment like their lead-core counterparts.[38] Due to the prevalence of lead in game meat, many states, including Colorado, recommend pregnant women and children refrain from eating game harvested using lead ammunition.[39] Hunters enjoy their sport as a source of clean, natural, sustainable meat—but using lead ammunition undermines this desire by putting hunters and their families at risk of lead poisoning. As Carrol Henderson, a hunter and educator with the Minnesota Department of Natural Resources, once said, "a good bullet should not kill twice."[40]

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30 *Id*.

31 *Lead poisoning*, MAYO CLINIC, https://www.mayoclinic.org/diseases-conditions/lead-poisoning/symptoms-causes/syc-20354717.

32 AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY, *supra* note 28.

33 OCCUPATIONAL SAFETY AND HEALTH ADMIN., PROTECTING WORKERS FROM LEAD HAZARDS AT INDOOR FIRING RANGES, https://www.osha.gov/sites/default/files/publications/OSHA3772.pdf.

34 Sam Totoni et al., *Lead in Hunted Meat: Who's Telling Hunters and Their Families?*, ENV'T HEALTH NEWS (Feb. 25, 2020), https://www.ehn.org/lead-ammunition-in-meat-2645108170.html.

35 A. Dobrowolska & M. Melosik, *Bullet-Derived Lead in Tissues of the Wild Boar (Sus Scrofa) and Red Deer (Cervus Elaphus)*, 54 EUR. J. WILDLIFE RSCH. 231, 234 (2008), https://doi.org/10.1007/s10344-007-0134-y.

36 Sam Totoni et al., *supra* note 34.

37 Andrew McKean, *Is Game Meat Shot with Lead Safe to Eat?*, OUTDOOR LIFE (Oct. 15, 2019), https://www.outdoorlife.com/is-game-meat-shot-with-lead-safe-to-eat/.

38 *Bullet Performance*, HUNTING WITH NON-LEAD, https://huntingwithnonlead.org/ammunition/bullet-performance.

39 *Information on Lead in the Meat of Wild Game,* NJ DIVISION OF FISH & WILDLIFE (Jan. 2012), ht https://www.nj.gov/dep/fgw/news/2012/lead_in_meat.htm.

40 Lynne Peeples, *In the Battle Over Lead Ammunition, Science Collides With Culture*, UNDARK (Jan. 30, 2017), https://undark.org/2017/01/30/lead-ammunition-bullets-hunting-copper/.

Yet despite the acknowledgment by state agencies that deer meat contaminated with lead presents a health risk to consumers, venison that is donated to food banks and other outlets in Colorado is typically harvested by hunters using lead-based ammunition. Studies of donated venison in other states have found that a significant portion of packages contain lead fragments and measurable lead, which can exceed health guidance limits for children, and that lead particle contamination is difficult to detect or remove once it is in the meat. For example, a 2025 study done on New York-donated venison concluded that "there is a high likelihood that people consuming donated hunted meat in NY will consume lead, and the FDA IRL [interim reference level, or the level of dietary exposure at which the contaminant poses a potential health concern] may be exceeded in a single bite."[41] This finding is especially concerning given that lead accumulates in the body, rather than being flushed out of the system.

NON-LEAD AMMUNITION IS AVAILABLE, AFFORDABLE, AND EFFECTIVE

Groups opposed to a prohibition on the use of lead ammunition in hunting activities claim that lead-free alternatives are too unavailable, unaffordable, and ineffective to be an option for most hunters. None of these claims are factually supported. As a recent Backcountry Hunters and Anglers article stated,

> Now, over 30 years after the first copper bullets began spiraling down rifle bores, hunters can find non-lead projectiles that will topple animals from prairie dogs to cape buffalo. Some bullets even deliver bone-shattering performance to 600 yards and beyond. The reasons for switching to non-lead are numerous: excellent weight retention and penetration, consistent expansion, and less risk of lead fragments ending up on dinner plates and in the bellies of scavengers. "Making the switch" makes changing ammunition sound like a bigger deal than it usually is.[42]

Lead ammunition for wildlife hunting activities was banned statewide in California on July 1, 2019. In recent years, New York, along with Minnesota, Maine, Washington, and Oregon have all either introduced legislation to prohibit the use of lead ammunition for hunting purposes or in certain areas, or have proposed an outright ban on the sale of lead ammunition and tackle.[43] Movements around the country to ban lead ammunition have inspired ammunition manufacturers to innovate effective lead-free alternatives.

NON-LEAD AMMUNITION IS READILY AVAILABLE

California maintains a database of certified non-lead ammunition from over 60 different manufacturers currently available on the market.[44] The largest ammunition manufacturers, such as Remington and

41 Peter E. Nye et al., *Assessing Lead Levels in New York-Donated Venison*, 88 J. FOOD PROT. (Jul. 2025), https://pubmed.ncbi.nlm.nih.gov/40484202/.

42 Mike McTee, *Making the Switch: A Quick Guide to Going Non-Lead*, BACKCOUNTRY HUNTERS AND ANGLERS (Nov. 7, 2022), https://www.backcountryhunters.org/making_the_switch_a_quick_guide_to_going_non_lead.

43 *Lead Ammunition and Fishing Tackle Bans*, CONG. SPORTMEN'S FOUND., https://congressionalsportsmen.org/policy/lead-ammunition-and-fishing-tackle-bans/.

44 *Certified Nonlead Ammunition*, CAL. DEP'T OF FISH AND WILDLIFE, https://wildlife.ca.gov/Hunting/Nonlead-Ammunition/Certified.

Winchester, have produced non-toxic shot since 2008.[45] A review of the calibers and types of manufactures reveals non-lead bullets and shot of virtually every size and type. Thirty-seven companies internationally distribute ammunition made with lead-free bullets.[46] Nontoxic shot is, of course, available all across the country during waterfowl hunting season due to the 1991 federal ban—so clearly, there are no impediments to widespread distribution and retail of these products, regardless of state or locality. Online vendors, too, offer non-lead shot, even for less common cartridges, and custom loaders can make made-to-order boxes of non-lead bullets. In New York, for example, there are over 100 retail arms dealers that are confirmed to carry non-lead ammo.[47]

NON-LEAD AMMUNITION IS AFFORDABLE

Some maintain that alternatives to lead ammunition are often two to four times as expensive as their lead counterparts, but recent testimonials from hunters who have made the switch and a review of current ammunition prices prove that assertion is false. While is true that non-lead ammunition can cost more than certain types of lead ammunition, generally, the price of non-lead is the same as premium lead ammunition, and sometimes it is even cheaper.

Visits to online ammunition sellers confirm the wide availability and cost-effectiveness of non-lead ammo. One of the most popular big game ammunition cartridges is the .270 Winchester. Cabela's, a major online hunting supply shop, currently sells a box of 20 lead-free, copper 130 grain .270 Winchester cartridges for $42.99, or $2.15 per round.[48] The cheapest, and most poorly rated, lead .270 Winchester cartridge offered by Cabela's is sold for $1.35 per round[49], while the large majority of the higher quality lead ammunition that matches or surpasses the consumer rating of the copper option is sold at prices as high as $3.00 per round.[50] With 27 different kinds of .270 cartridges available on Cabela's site, 12 of the lead containing choices are more expensive than the non-lead option. An expert academic review of the market found similar results.[51] For the few non-lead alternatives more expensive than lead bullets, the New York Department of Environmental Conservation is offering a

45 *Id*.

46 Vernon George Thomas, *Lead-Free Hunting Rifle Ammunition: Product Availability, Price, Effectiveness, and Role in Global Wildlife Conservation*, 42 AMBIO 737 (2013), https://doi.org/10.1007/s13280-012-0361-7.

47 *Finding Non-lead Ammo*, HUNTERS FOR EAGLE CONSERVATION, https://huntersforeagleconservation.org/new-york/find-non-lead-ammo/.

48 *Winchester Deer Season Copper Impact .270 Win 130 Grain Centerfire Rifle Ammo*, CABELA'S, https://www.cabelas.com/shop/en/winchester-deer-season-copper-impact-270-win-130-grain-centerfire-rifle-ammo (last visited Oct. 10, 2024).

49 *Herter's .270 Winchester 130 Grain Soft Point Centerfire Rifle Ammo*, CABELA'S, https://www.cabelas.com/shop/en/herters-270-winchester-130-grain-soft-point-centerfire-rifle-ammo (last visited Oct. 10, 2024).

50 *Nosler Trophy Grade .270 Winchester 130 Grain Centerfire Rigle Ammo*, CABELA'S, https://www.cabelas.com/shop/en/nosler-trophy-grade-270-winchester-130-grain-centerfire-rifle-ammo (last visited Oct. 10, 2024).

51 Vernon George Thomas, *supra* note 46.

rebate for the purchase of non-lead ammunition during the 2024-2025 deer hunting season[52] that is expected to continue for the next couple of years.[53]

Even if non-lead ammo were incrementally more costly, ammunition only accounts for 5 percent of total hunting expenses.[54] Using non-lead ammunition would have an extraordinarily small impact, percentage-wise, on a hunter's overall budget. In fact, based on the largest per-unit price difference between lead and non-lead ammo of 14 percent for the .300 H&H Magnum Federal Premium TSX[55]—which far exceeds the average price difference—using only non-lead ammunition would increase total hunting-related expenditures by less than 1 percent.[56]

NON-LEAD AMMUNITION IS EFFECTIVE

Non-lead bullets have been found to have comparable, if not superior, performance to their lead counterparts.[57] Indeed, copper bullets were originally designed for the "premium" market not because of concerns over lead poisoning but rather for their enhanced ballistic capabilities.[58] Hunters and staff from the Wisconsin Department of Natural Resources have found that copper bullets outperformed "all the various incantations of lead bullets."[59] They also found that copper bullets expand well at low or high speeds and allow hunters to use lighter weight slugs to reduce recoil.[60] Many studies have found no consistent or significant differences in efficacy and lethality between lead and copper bullets.[61] Even CPW's own workshops comparing lead and non-lead alternatives concluded non-lead ammunition is just as effective. Non-lead alternatives have a high level of acceptance among hunters too. In one survey, 90% of hunters and ranchers surveyed approved of the use of copper bullets.[62] The U.S. Army has been using non-lead ammunition for more than a decade with consistently good results.[63]

Lifelong hunter Dave Clausen said, "[hunters] have ethical and moral responsibilities to kill individual animals cleanly and quickly, and prevent waste of a natural resource." Using non-lead over lead ammunition directly aligns with these values. Non-lead ammunition is extremely accurate and is lighter

52 John Salka, *DEC Expands Non-Lead Ammunition Study to Help Improve Bald Eagle and Golden Eagle Conservation Efforts*, N.Y. Dep't of Env't Conservation (Aug. 21, 2024), https://dec.ny.gov/news/press-releases/2024/8/dec-expands-non-lead-ammunition-study-to-help-improve-bald-and-golden-eagle-conservation-efforts.

53 Mike Lynch, *DEC, Partners Offer Rebate to Hunters who Buy Lead-Free Ammo*, Adirondack Explorer (Nov. 3, 2024), https://www.adirondackexplorer.org/stories/dec-partners-offer-rebate-to-hunters-who-buy-lead-free-ammo.

54 Nat'l Shooting Sports Found., Hunting in America: An Economic Force for Conservation (2018), https://www.fishwildlife.org/application/files/3815/3719/7536/Southwick_Assoc_-_NSSF_Hunting_Econ.pdf.

55 Vernon George Thomas, *supra* note 46 at 742.

56 Ammunition expenditures as a share of total hunting expenditures would increase from 5.2 percent to 5.9 percent by switching from lead ammo to non-lead ammo with the greatest per-unit price difference.

57 *Bullet Performance*, *supra* note 38.

58 *Id*.

59 Patrick Durkin, *Is the Copper Bullet Debate Finally Settled?*, MeatEater (Nov. 21, 2019), https://www.themeateater.com/hunt/firearm-hunting/is-the-copper-bullet-debate-finally-settled.

60 *Id*.

61 Niels Kanstrup et al., *Efficacy of Non-Lead Rifle Ammunition for Hunting in Denmark*, 62 Eur. J. Wildlife Rsch. 333 (2016), https://doi.org/10.1007/s10344-016-1006-0.

62 John Ritter, *Lead Poisoning Eyed as Threat to California Condor*, USA Today (Oct. 23, 2006), https://usatoday30.usatoday.com/news/nation/2006-10-23-condor_x.htm.

63 C. Todd Lopez, *'Green Bullet' as Effective as M855 Round – Consistently*, U.S. Army (May 6, 2011), https://www.army.mil/article/56157/green_bullet_as_effective_as_m855_round_consistently.

and faster, which in turn reliably penetrates bone and thick-skinned game.[64] This ensures consistently high stopping power for quick kills. Because non-lead bullets do not fragment and therefore can travel further into their target, non-lead bullets can completely pass through the animal. The additional exit wound can make trailing easier for hunters. [65] Finally, since non-lead ammo does not fragment, the area of bloodshot is minimized and less meat is wasted.[66] In sum, using non-lead ammunition is not only more effective than using lead ammo, but also aligns better with hunting ethics.

A VOLUNTARY POLICY IS INEFFECTIVE

Other than the incremental phase-out approach described above, the federal government is using soft incentives, such as encouraging the voluntary adoption of non-lead[67] ammunition, to encourage the disuse of lead in fishing and hunting. Proponents of this approach believe that it will be much more politically palatable. Opponents, including top researchers and experts, believe that voluntary incentives are a meaningless political salve without any meaningful positive effect.

John Schulz, natural resources professor at the University of Missouri, criticized these voluntary programs: "The current challenge is there is tremendous lip service given to voluntary programs but little meaningful effort… voluntary programs have become a euphemism for doing nothing or next [to] nothing."[68]

Unfortunately, it is this inadequate approach that some states, like Colorado, have recently adopted. Other states, like New York have also encouraged its citizens to use non-lead ammunition through a voluntary program, claiming that voluntary programs have "high rates of conversion and success at minimizing secondary mortality of scavenging wildlife that ingest lead fragments,"[69] and citing in support of that claim a study on the effect of vouchers on non-lead ammo uptake among hunters in California condor territory. However, that study offered no real support whatsoever for the Working Group's broad claim that voluntary programs have "high rates of… success at minimizing secondary mortality of scavenging wildlife that ingest lead fragments."[70] but any policy short of a full ban is not enough. Even the results of very high levels of compliance with a regulatory program fail to measure

64 *How to Switch – Centerfire*, SPORTING LEAD-FREE, https://www.sportingleadfree.org/how-to-switch-centerfire.

65 Dan Zimmerman, *Non-Lead Alternatives to Lead Ammunition Just Make Sense (Happy Earth Day!)*, The Truth About Guns (Apr. 22, 2017), https://www.thetruthaboutguns.com/alternative-ammo/.

66 Jim Heffelfinger, *Lead Ammo and Wildlife: Separating Science from Advocacy*, MEATEATER (Sep. 1, 2022), https://www.themeateater.com/hunt/firearm-hunting/lead-ammo-and-wildlife-separating-science-from-advocacy.

67 Although the terms "lead-free," "non-lead" and "nontoxic" are used interchangeably, as a result of the manufacturing process, trace levels of lead can exist in any metal projectile used for bullets. This means that while ammunition may not be 100% lead-free, the minute trace levels of lead in nonlead ammunition have been found to be functionally nontoxic to wildlife and humans. Both the U.S. Fish and Wildlife Service and the California Department of Fish and Game have established a maximum threshold of 1% lead content in order to be considered non-toxic or nonlead ammunition.

68 Michael Doyle, *A Lead Ammo Compromise? Incentives Edge Out Bans.*, E&E NEWS BY POLITICO (Nov. 28, 2023, 1:22PM), https://www.eenews.net/articles/a-lead-ammo-compromise-incentives-edge-out-bans/.

69 N.Y. DEP'T OF ENV. CONSERVATION, N.Y. STATE LEAD AMMUNITION WORKING GRP., MINIMIZING RISKS TO WILDLIFE AND PEOPLE FROM LEAD HUNTING AMMUNITION (Apr. 2022), available at https://extapps.dec.ny.gov/docs/wildlife_pdf/leadammunitionreport2022.pdf.

70 Loren Chase & Michael J. Rabe, *Reducing Lead on the Landscape: Anticipating Hunter Behavior in Absence of a Free Nonlead Ammunition Program*, 10 PLOS ONE 1 (2015), https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0128355.

up to the benefits from a full ban. In a study of lead exposure in California condors, researchers found that condors in California, where a regulatory ban is implemented, experienced lower blood-lead levels, whereas the lead levels of condors in Arizona, which has a voluntary program with an 88 percent compliance in lead reduction efforts,[71] remained unchanged.[72] This shows that even very high (reported) compliance rates fail to become realized benefits on the ground in the real world.

According to the World Health Organization, no level of lead exposure is known to be without harmful effects.[73] Lead does not naturally break down, can persist in the environment for years, and bioaccumulates in humans and wildlife.[74] Only 100 percent compliance with non-lead ammunition is sufficient to realize the benefits of reducing lead exposure. This can only be achieved with a state-wide ban on lead ammunition. Given the widespread availability of non-lead alternatives, a ban on the use of lead ammunition is the practical solution to the problem of lead exposure.

A BAN WOULD NOT DIMINISH HUNTING ACTIVITIES

California banned lead ammo in 2019. Despite hunting groups claiming that the ban would result in fewer hunters taking to the forests, California Fish and Wildlife saw a 9% increase in hunting licenses from 2019 to 2020.[75] Hunters are already acquainted with hunting regulations, and there are several regulations on the allowable hunting equipment when hunting deer, bear, and game birds.[76] Hunters are also well-accustomed to the federal bans on lead ammunition that have been in force for many years. Regulations on hunting are far from antithetical to collaboration with hunters. A ban on lead ammunition is just another regulation intended to ensure the health of hunters and wildlife.

A BAN WOULD NOT BE DIFFICULT TO ENFORCE

Putting aside the tremendous benefits to human health and the environment that a lead ammunition ban would bring, enforcing a ban would not be burdensome. Hunting is already subject to numerous regulations, such as seasons and bag limits. Enforcement of this regulation is not burdensome whatsoever. Hunters are expected to abide by the law, and if they are found to be in violation, they are prosecuted.

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71 BRENDA SMITH ET AL., CALIFORNIA CONDOR RECOVERY PROGRAM IN THE SOUTHWEST FOURTH REVIEW 15 (2012-2016) (2017), https://bloximages.chicago2.vip.townnews.com/stgeorgeutah.com/content/tncms/assets/v3/editorial/5/26/5260773e-1f5a-5818-a10c-8922e7101b97/6639b0905698c.file.pdf. Compliance in lead mitigation efforts includes shooting with non-lead bullets, packing out the gut pile, taking a head or neck shot, or electing to use archery or a crossbow during the rifle hunt. 67 percent of all Arizona hunters used non-lead ammo.

72 John H. Schulz et al., *Policy Comparison of Lead Hunting Ammunition Bans and Voluntary Nonlead Programs for California Condors*, 47 WILDLIFE SOC'Y BULL. e1448 (2023), https://doi.org/10.1002/wsb.1448.

73 *Lead Poisoning*, WORLD HEALTH ORG. (Sep. 27, 2024), https://www.who.int/news-room/fact-sheets/detail/lead-poisoning-and-health.

74 *Persistent, Bioaccumulative and Toxic Chemicals (PBTs)*, TOXIC-FREE FUTURE, https://toxicfreefuture.org/toxic-chemicals/persistent-bioaccumulative-and-toxic-chemicals-pbts/ (last visited Oct. 10, 2024).

75 *Hunters in California Ditch the Lead and Keep the Conservation Heritage*, SIERRA CLUB ANGELES CHAPTER (May 25, 2021), https://www.sierraclub.org/angeles/blog/2021/05/hunters-california-ditch-lead-and-keep-conservation-heritage.

76 *See* N.Y. LAW § 11-0901(3)(b-c) (limiting deer and bear hunting to gun, crossbow, and long bow in the appropriate seasons and game bird hunting to long bow or gun).

The fact that some hunting occurs on private lands is also not an obstacle to regulating lead ammunition. Governments can, as a general matter, regulate activities on private land; California's ban on nontoxic ammunition applies to both public and private land.[77] State hunting seasons are also a regulation that apply to private and public lands equally.[78] Similarly, a prohibition on lead ammunition is a regulation that would apply equally to private and public lands alike. From a policy perspective, it makes sense to regulate lead ammunition on both private and public land, because the adverse effects of lead toxicity are not isolated to the area in which the hunting occurs. Migratory birds may fly into private land to eat lead-tainted carcasses, fly out, become poisoned and die elsewhere. Wildlife, as a natural resource, is mobile and diffuse, and the regulation of toxic ammunition should recognize that.

CONCLUSION

Strong scientific literature supports the conclusion that lead ammunition is a significant source of lead exposure to wildlife. Lead exposure sickens and kills all organisms, especially birds and mammals. Humans are no exception to the negative impacts of lead exposure, which are well documented across the medical community.

Non-lead ammunition not only is available at many different online and in-person retail vendors, but its prices are comparable if not cheaper than lead ammunition. Non-lead bullets are proven to be just as effective as lead bullets and even have performance-based advantages over lead ammunition.

Given the definite harms of lead ammunition to people and wildlife and the accessibility and readiness of safe substitutes, a voluntary policy is not enough. Because a ban is the only way to effectively curb the harms of lead, this petition requests the adoption of a new rule phasing out the use of lead-based ammunition in regulated hunting in Colorado.

We are prepared to provide additional information in support of our Petition or answer any questions you may have regarding our submission.

Thank you for your consideration of this critical issue and request for rulemaking.

Sincerely,

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77 *Nonlead Ammunition in California*, CAL. DEP'T OF FISH AND WILDLIFE, https://wildlife.ca.gov/Hunting/Nonlead-Ammunition#25046252-how-does-this-affect-private-lands-and-landowners.

78 *See* N.Y. LAW § 11-0907(2); *Deer Hunting Season Dates*, EREGULATIONS, https://www.eregulations.com/newyork/hunting/deer-hunting-season-dates.

animal wellness action

CENTER FOR A HUMANE ECONOMY

Lead Ammunition Imperils Wildlife, Hunting Families

Use of alternative forms of ammunition will remediate widespread lead poisoning problem.

DECEMBER 2025

Topline Concerns

- Millions of birds and mammals, especially scavengers and predators, suffer and die from lead poisoning after feeding on carcasses or gut piles left by hunters that are impregnated with toxic lead fragments
- Lead bullet fragments contaminate game carcasses and gut piles, posing health risks to hunters, their families, and food-insecure individuals who rely on soup kitchens and food pantries. Children and pregnant women are at the greatest risk from neurological, cardiovascular, and developmental damage by lead ammunition residues in game meat.
- Non-lead ammunition (including copper, steel, bismuth, tungsten, and metal alloys) provides strong ballistic performance and delivers equal or superior killing power at only marginal additional cost. This shields nontarget species, reduces human health risks from lead exposure, and aligns with conservation and public health goals.

I. Why is lead ammunition an issue?

Lead bullets, slugs, and shot for hunting manmals and birds have been used since the invention of firearms in the early 15th century. The popularity of lead ammunition is due to its historical use, low cost, and its ballistic properties as a soft but dense metal. However, lead (Pb) is a heavy metal with no safe level of exposure. Lead is toxic to all animals, including humans. Lead is even toxic to plants. Lead mining and manufacturing is a small industry that generates enormous harm. Lead impairs the growth, development, and reproduction of microbes, insects, plants, and animals.

Lead does not break down or biodegrade. The ingestion of even small quantities of lead can deliver a range of adverse health impacts to people, especially children, pregnant women, and unborn children.

- Lead is particularly damaging to the brain and the rest of nervous system. Lead can quickly reach the bloodstream when inhaled as dust, ingested, or consumed in water. Unlike most toxicants and pathogens, it can pass into the brain through the blood-brain barrier.
- Lead mimics calcium's properties so that it accumulates in bone and teeth and interrupts metabolic processes.
- In humans, lead reduces IQs and increases the risk of heart disease, kidney failure, and premature death. Women and children are particularly vulnerable as lead exposure can cause miscarriage, premature birth, and low birth weight.

As evidence of lead toxicity has accumulated over the past century, efforts have been made to limit anthropogenic sources of Pb in the environment. Some of these efforts were successful. For example, in most developed countries, lead was banned from gasoline, paint, water pipes, and various household items (such as children's toys and pottery).

The U.S. Fish and Wildlife Service banned lead shot for waterfowl hunting in 1991. Despite this conservation triumph and the rapid transition by waterfowl hunters to non-toxic ammunition, hunters pursuing other game, from squirrels to rabbits to deer, moose, elk, and black bears, still use lead ammunition nearly 35 years later.

Unlike lead in batteries or other in industrial uses, lead ammunition is used as projectiles and expelled directly into ecosystems, posing risks to wildlife and humans. Lead ammunition is now the greatest, unregulated source of lead that is knowingly discharged into our environment. The U.S. annually produces billions of rounds of ammunition, including rimfire and centerfire cartridges and shotshells. Hunters and target shooters annually discharges at least 50,000 tons of lead into our nation's environment. This is equivalent to about 9 billion .22 caliber bullets or ~180 million car batteries worth of lead. In fact, most lead ammunition is manufactured from recycled lead batteries.

For millions of Americans, game meat, especially from deer and elk, is an important source of animal protein. There are about 12 million deer hunters in the U.S., and their families, friends, and neighbors consume more than 6 million deer annually, according to the National Deer Association. While the exact percentage of deer killed with lead ammunition is not known, available research and agency reports suggest that more than 90% of deer in the U.S. killed by firearms are shot with lead-based bullets.

II. Lead ammo & human health: venison with a side of lead

Lead ammunition widely used in deer hunting across the United States poses significant threats to human health. When a lead bullet strikes an animal, it often fragments into hundreds to thousands of tiny particles that can disperse well beyond the wound channel. These fragments may remain in the meat, even after standard butchering and trimming. They are often small enough to be unknowingly ingested.

Studies have found elevated blood lead levels in people who frequently consume wild game harvested with lead ammunition, particularly children and pregnant women, for whom even low doses can impair neurological development, lower IQ, and cause long-term cognitive and behavioral deficits. For adults, chronic lead exposure increases the risk of cardiovascular disease, kidney damage, and reproductive problems. The U.S. Food and Drug Administration does not recognize a safe limit for lead in meat. Because there is no safe level of lead exposure, these risks are a public health concern wherever lead-based hunting ammunition is common.

Most rifle bullets used for large game hunting expand upon impact to ensure maximum deadly effect. Expanding high-velocity lead bullets fragment upon impact, producing large to microscopic fragments, especially in larger game animals. A single round can shatter into millions of smaller fragments up to 18 inches away from the bullet's trajectory, especially when it strikes bone in deer and elk. Many of the fragments in the animal's tissues are tiny microparticles that are too small to see with the naked eye or to feel or otherwise sense when eating. These fragments scatter into the muscle and entrails of hunted animals. For a venison consumer, these particles bioaccumulate over time and contribute to rising lead levels, with the attendant and well-documented array of neurological and other health risks. Although the FDA does not recognize a safe limit for the amount of lead in meat, the European Commission set maximum levels at 0.1 parts per million (ppm). Lead concentrations more than 100 times this limit have been detected in the meat of lead-shot carcasses as far as six inches from the entry wound.

Scientists have used X-rays, CT scans, and other imaging technologies to visualize and count sometimes hundreds of minute lead particles in hunted meat. Chemical analysis has also detected high concentrations of lead in hunted carcasses. Most lead shards are too small to be seen with the naked eye, and minuscule fragments (nanoparticles) are not detectable even by X-rays. The lead shards can also dissolve during digestion, poisoning the surrounding tissues. Both the fragments and the contaminated meat are poisonous when consumed. Recent research found that in deer and grouse samples, lead micro- and nanoparticles too small to be detected by standard medical radiography exceeded levels set by the U.S. Centers for Disease Control and Prevention for protection of human health.

A strong body of scientific research demonstrates that lead-based ammunition frequently contaminates hunted meat and increases blood lead levels of humans and animals who consume it.

- In 2008, the Minnesota Department of Natural Resources experimentally shot 80 deer and sheep carcasses and evaluated the presence of lead in each. High-velocity ballistic tip bullets left an average of 141 fragments in a mean of eleven inches from the wound channel; some were farther. Some fragments were too small to see with anything but a sensitive X-ray image. Lead ammunition fired from high-powered rifles contaminated carcasses more than slower-moving lead slugs fired from shotguns.

- A 2009 study of 30 deer harvested with lead bullets in Wyoming and processed by 22 different meat processors found an average of 136 lead fragments per deer; 32% of the burger packages had at least one metal fragment. Twenty percent of the packages had only one fragment, 7% had two fragments, and 5% had 3 to 8 fragments. Burger packages always have more lead fragments than steaks and roasts.
- The Minnesota Department of Agriculture tested 1,029 commercially ground burger packages using X-rays and found lead fragments in 26%. Lead was also found in 2% of 209 packages containing whole cuts of meat. (Ground meat is far more likely to show detectable fragments than intact cuts because fragments mix through the batch during grinding, so that more samples for testing will test positive for lead.) Also, the cuts that are ground are usually the shoulder and neck musculature, which are much more likely to be near the point of bullet impact than the loins and rumps, which are considered the primal cuts.
- In a 2008 Wisconsin study, researchers collected 183 packages of venison burgers from hunters' freezers, food pantries, and meat processors. They found that 15% of commercially processed burgers and 8% of hunter-ground packages were contaminated with lead.
- Ground venison packets from shotgun- and archery-harvested white-tailed deer in Illinois in 2013 and 2014 were analyzed for metal contamination. Radiographs indicated that 48% of twenty-seven ground venison packets from ten shotgun-harvested deer contained lead metal fragments, while none of the fifteen packets from three archery-harvested deer contained fragments.
- Multiple studies have found a direct link between game harvested with lead ammunition and spikes in blood lead. For example, in a 2009 North Dakota study with 736 participants, those who consumed wild game had higher blood lead levels than those who did not.

The 2025 PhD thesis of Annina Haase, "Food safety implications of metals from bullet fragments in game meat: An investigation of bullet composition, bullet fragmentation and gastrointestinal solubility," cites 308 references on lead fragments in game meat, the most comprehensive literature review of this topic ever published. The thesis highlights the need for greater policy consideration of the biological hazards from lead ammunition and fragmentation for game meat food safety, i.e., a regulatory focus beyond the environmental impacts of lead ammunition.

Not surprisingly, venison donated to food banks can also be contaminated with lead fragments from lead-based ammunition. Over 40 states operate game meat donation programs associated with food banks, facilitating the distribution of roughly 1 million kilograms (1,100 tons) of game meat annually (Buenz et al 2024). Most donated game meat is ground deer meat (venison), as well as wild hog and goose.

The proportion of donated ground venison packages containing detectable lead fragments is typically 10-25%. For example, the U.S. Department of Health and Human Services found that 15% of donated one-pound ground venison packages sampled from Wisconsin food banks contained visible lead fragments. From 2014 to 2019, the Minnesota Department of Agriculture found and discarded 9% of donated venison because of lead contamination observed via X-ray. This prevented more than 4,243 lb. of lead-adulterated venison from reaching Minnesota food banks. Donations of hunted meat from archery season and from animals killed with non-lead ammunition have extremely low levels of lead contamination.

Venison donation programs provide millions of meals to food banks across the country. States with venison donation programs include those that also harvest the most deer: Texas, Michigan, Pennsylvania, Wisconsin, and Georgia. None

of these five states require X-ray inspection of meat for lead contamination. Minnesota is the only state with mandatory screening of donated hunted meat for lead contamination. Some states, such as Iowa and South Dakota, put warning labels on donated venison stating that lead fragments may be present. This underlying lack of food safety standards for adulterated donated food increases risks to low-income recipients who are already disproportionately affected by elevated blood lead levels (BLLs).

III. Lead-linked losses: wildlife casualties in the wake of the hunt

Lead-based ammunition poses serious threats to wildlife, especially birds, and particularly avian or mammalian scavengers and predators that feed on carcasses or gut piles left in the field or directly ingest environmental spent lead bullets. Lead poisoning from ammunition also creates important global conservation problems for many wildlife species, especially raptors, including the highly endangered California condor. An estimated ten million to twenty million birds and other animals die each year from lead poisoning in the United States after ingesting lead left behind by hunters.

Lead poisoning is a leading cause of death in some raptor populations, causing paralysis, emaciation, reproductive failure, and death. A lead fragment the size of a grain of rice is lethal to a mature bald eagle, meaning that a standard 150-grain lead bullet can poison ten eagles. The deadly metal bioaccumulates in an eagle's system throughout their lives, causing long-term harm even at low exposure levels. Just as in humans, there is no safe amount of lead exposure. For this reason, lead is often called "the silent killer."

Slabe et al (2022) looked at lead levels in samples collected from 1,210 bald and golden eagles from 38 U.S. states across North America. They found that almost half of all animals sampled had chronic, toxic levels of lead (as measured in bone), and about a third of bald and golden eagles had acute Pb poisoning, as measured in liver, blood, and feathers. Demographic modeling suggested that these levels are high enough to suppress population growth in both species.

Mammalian predator scavengers, including foxes, coyotes, and bears, are similarly at risk from lead in spent ammunition, as are waterfowl who ingest spent lead shot from the ground or sediments. The problem is widespread and well-documented, with numerous studies showing that seasonal spikes in wildlife lead poisoning follow hunting seasons. Domestic animals, such as dogs and cattle, are also exposed to Pb through ammunition. Coyotes, wolves, and foxes are less likely to die from lead poisoning (as they pass Pb fragments more quickly through their digestive tract as compared to birds), but they can still suffer sublethal effects such as organ damage, neurological impairment, and immune suppression. Hunting dogs fed trimmings from lead-shot game have also been poisoned.

The ecosystem impacts of lead ammunition extend beyond individual wild animal deaths. The loss of top predators and scavengers can disrupt ecological balance, leading to cascading effects including increased carcass persistence, prey population changes, and altered nutrient cycling. In aquatic systems, lead bullets and shot can persist in sediments for decades, leaching into water and posing ongoing hazards to fish, amphibians, and aquatic invertebrates. Because lead is a persistent, bio-accumulative toxin, it can move up the food chain, magnifying exposure risks for both wildlife and humans who rely on hunting and fishing for subsistence.

IV. Lead-free ammunition is available and in wide use

Lead-free ammunition, including steel, copper, bismuth, and tungsten, is widely available and increasingly effective from both cost and lethality perspectives. Copper and copper-alloy bullets, for example, retain their weight, mushroom predictably on impact, and do not fragment into toxic particles, thereby eliminating the primary source of contamination.

Advances in bullet design have ensured that non-lead ammunition can approach or match the accuracy and lethality of lead rounds for deer hunting. The lethality of copper usually exceeds that of lead bullets in larger game. In a survey of manufacturers who produce both lead and non-lead ammunition in the same caliber, the non-lead rounds are usually 25-50% more expensive. That sounds like a lot, but so few rounds are fired on most hunting trips that the cost difference is negligible. Transition programs in several states and tribal areas have shown that voluntary or mandated shifts to non-lead ammunition can significantly reduce Pb exposure in both humans and wildlife within just a few hunting seasons.

Given the known health risks, the proven ecological harm, and the availability of safe, effective alternatives, phasing out lead ammunition in deer hunting is a practical and scientifically supported step toward protecting public health and sustaining healthy ecosystems. The reasons for switching to non-lead are numerous: excellent weight retention and penetration, consistent expansion, and less risk of lead fragments ending up on dinner plates and in the bellies of scavengers.

Hunters have touted the lethality of non-lead bullets for decades. Even the April 10, 2010, issue of the National Rifle Association's (NRA's) American Hunter Magazine wrote:

> "Every now and then a new bullet comes along that redefines what we think we know about hunting projectiles. The Barnes all-copper X-Bullet was one of those, and it has become the most imitated big-game bullet on the market. It was introduced in 1989, and ever since, the Barnes X has been a favorite of serious big game hunters wherever men take rifles into wild places."

Just as non-toxic alternatives have been available for waterfowl hunters for decades, there are readily available alternatives for big game hunting. Copper or brass bullets are available in virtually every rifle and handgun caliber. Copper or brass bullets' ballistics are similar to lead, while weight retention during penetration is usually superior. In fact, the U.S. military is transitioning to non-lead small arms ammunition under its "green ammunition" initiative.

Copper vs Lead Bullets

30 caliber Winchester magnum lead core with copper jacket
- Highly toxic
- Hundreds of fragments

30 caliber Winchester magnum solid copper bullet
- Non-toxic
- No fragmentation

https://www.usgs.gov/media/images/copper-and-lead-ammunition-comparison

V. Banning lead ammunition for hunting protects people and wildlife

In public health, primary prevention refers to actions taken before a disease or injury occurs to prevent it from happening in the first place. The successful American history of banning lead from paint (1977), plumbing for drinking water (1986), and gasoline (1996) in reducing lead levels in humans demonstrates the utility of the primary lead prevention approach. For example, following the lead ban from gasoline, blood lead levels in U.S. children decreased from 15.2 µg/dL in the late 1970s to 0.83 µg/dL by 2016. This reduction is associated with an average increase of 4-5 IQ points across the population.

Similarly, the nationwide ban on lead shot for waterfowl hunting in the United States, implemented in 1991, shows the benefits of banning lead ammunition. Prior to the lead ban for waterfowl hunting, an estimated 2,700 tons of shot were deposited in wetlands each year. This policy reduced lead ingestion among waterfowl by approximately 50%, preventing an estimated 1.4 million duck deaths annually.

A strong, multi-line evidence base shows that restricting or banning lead ammunition produces measurable wildlife and human-health benefits. These include:

- Large, measurable reductions in waterfowl lead poisoning and crippling occurred after lead-shot bans in 1991, as described above. Crippling (wounding) occurs when a hunter shoots an animal, but the animal is wounded and not immediately killed, allowing it to escape and die a slow and painful death from starvation, predation, or exposure. Whenever hunters are asked to transition away from the use of lead ammunition to mitigate lead's known risks to wildlife and people, hunters frequently cite concerns about the effectiveness of non-lead ammunition and how it will result in greater crippling rates and associated animal welfare costs. However, recent studies have found no differences in crippling rates using lead and steel ammunition. An Illinois study evaluated 37 years of waterfowl harvest data overlapping the mandated federal transition to non-lead shot for waterfowl hunting to assess how crippling rates changed following the ban. The authors (Ellis and Miller, 2022) reported, "The average crippling rate prior to the lead shot ban was 23% for both ducks and geese and reduced to an average of 15% and 11% for ducks and geese (respectively) following the ban. In addition, the annual trend in the proportion of ducks and geese crippled reversed following the ban, from a significant annually increasing to a significant annually decreasing trend."
- The recovery of the California condor from near extinction after lead ammunition was banned from its range shows that restricting lead ammunition reduces the pathways that poison scavengers and predators. Golden eagles and turkey vultures have also shown decreased lead exposure, indicating broader ecological benefits. Opponents of California's lead ammunition ban acknowledge that lead poisoning has historically hindered the recovery of the California condor. However, they argue that the species' resurgence can be attributed to intensive management efforts, such as captive breeding and veterinary care, rather than the elimination of lead ammunition.
- Human biomonitoring in Europe and North America links game consumption to higher blood lead, especially in frequent game meat consumers, so reducing ammunition-derived contamination reduces human exposure

and risk. Switching to non-lead bullets meaningfully lowers lead residues in edible tissues of game meat, reducing lead exposure in humans who consume it. There is some evidence that lead exposure from lead bullets may pose a higher risk of lead poisoning in humans compared to lead shot, primarily due to the greater fragmentation of lead bullets upon impact. Lead shot, commonly used in shotgun ammunition, consists of small pellets that are less likely to fragment into numerous tiny particles upon impact. However, the ingestion of even a single lead pellet can be harmful, particularly to children and pregnant individuals. If ingested with food, lead shot can become lodged in the appendix and release lead over time, commonly observed in people who regularly eat meat from wild fowl killed using lead shot.

- Regulation and policy: when governments require non-lead ammunition, benefits to human health and wildlife are expected. For example, California's lead ammunition ban has led to measurable health improvements in wildlife, particularly scavenger species like the California condor, and has reduced human exposure to lead through game meat consumption.

Several states have specific lead regulations beyond the federal waterfowl restrictions, many requiring non-toxic shot on certain management units or statewide. Waterfowl Production Areas and U.S. Fish and Wildlife Service refuges generally require non-toxic shot for hunting upland bird species because these areas are managed primarily for waterfowl and often contain numerous wetlands.

As of September 2025, California is the only U.S. state that has fully implemented a ban on lead ammunition for all hunting. This statewide prohibition began in 2019 and was phased in over several years, starting with restrictions in the California condor's range in 2007. Lawmakers in Maryland, Minnesota, New York, Maine, Oregon, and Washington have introduced legislation in recent years to prohibit the use of lead ammunition for hunting purposes or in certain areas, but these proposals have not been enacted into law.

At the federal level, while the U.S. Fish and Wildlife Service has announced plans to phase out the use of lead ammunition and/or fishing tackle on half a dozen national wildlife refuges by 2026, the agency continues to allow lead ammunition and tackle on the vast majority of refuges, even though the agency recognizes the adverse effects of lead on wildlife.

At certain other refuges, the U.S. Fish and Wildlife Service has initiated a voluntary lead-free pilot program. This project, extended for the 2025-2026 hunting season, offers rebates to hunters who voluntarily use lead-free ammunition on 13 national wildlife refuges across 11 states. The initiative aims to encourage the adoption of nonlead ammunition and reduce the risk of lead exposure to wildlife. Unfortunately, voluntary lead-free ammunition programs have shown limited effectiveness in reducing lead exposure among wildlife and humans. While they can foster collaboration and reduce conflict among stakeholders, their impact on hunting behavior and wildlife health has been minimal. They usually fail to achieve widespread compliance.

For example, a 2025 United Kingdom study found that 99% of pheasants and 100% of red grouse sampled were still killed with lead ammunition, despite a voluntary pledge by the UK's nine leading game shooting and rural organizations to phase out lead shot by 2025. "Because so many raptors were dying of plumbism (lead poisoning), Audubon of Kansas offered varminters nontoxic copper ammo at the same cost as cheaper lead bullets," wrote award-winning hunting writer Ted Williams in an essay describing large-scale target shooting of prairie dogs in the Sunflower State. "After four years, it didn't have a single taker. Varminters resist copper for no other reason than they've always used lead." In contrast, California's mandatory lead ammunition ban has led to measurable reductions in lead exposure among wildlife, such as California condors, golden eagles, and turkey vultures.

One reason for this failure to implement a hunting ammunition lead ban is the opposition from the firearms and ammunition interest groups and manufacturers. This includes the National Rifle Association (NRA), Gun Owners of America (GOA), Safari Club International (SCI), Congressional Sportsmen's Foundation (CSF), National Shooting Sports Foundation (NSSF), and firearm and ammunition manufacturers.

VI. Congress debates lead ammunition policy

In November 2025, U.S. Rep. Ted Lieu, D-Calif., introduced the Lead Endangers Animals Daily (LEAD) Act (H.R.6268) to phase out the use of lead ammunition on lands and waters under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS). Senator Tammy Duckworth, D-Ill., previously introduced a similar bill, S.3852, in the 118th Congress. The bills aim to mitigate the risks of lead toxicosis in people and wildlife, including federally listed threatened and endangered species, particularly scavengers like bald eagles and California condors. The bills have not yet passed either chamber of Congress.

There is also an effort in Congress by lawmakers allied with the NRA to block federal agencies from restricting the use of lead ammunition on our federal lands. The Protecting Access for Hunters and Anglers Act of 2025, S.537 and H.R.556, introduced by Sen. Steve Daines, R-Mont., and Rep. Rob Wittman, R-Virg., aims to prevent federal agencies from banning lead ammunition or fishing tackle on federal lands unless there is unit-specific scientific evidence showing harm to wildlife populations and the regulation is approved by the relevant state. This legislation prioritizes recreational access and affordability for hunters and anglers, asserting that blanket federal bans are unnecessary and burdensome. Together, these bills reflect opposing philosophies and a sharp divide in federal policy approaches: one prioritizes environmental protection, the other emphasizes recreational access and state control.

X-rays of deer carcasses shot with lead bullet & copper bullet

- Bright white spots = lead fragments
- Spread throughout animal's body
- Contaminate meat & environment

- No copper bullet fragments

VII. Evolving USFWS views of lead ammunition for hunting on National Wildlife Refuges

The FWS operates hunting and sport fishing programs on wildlife refuges to implement Congressional directives to facilitate refuge-compatible priority wildlife-dependent recreational opportunities, including fishing and hunting. The recently (re)-introduced Lead Endangers Animals Daily (LEAD) Act (H.R.6268) proposes to phase out the use of lead ammunition on lands and waters under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS). Specifically, the bill would "require the Secretary of the Interior to prohibit the use of lead ammunition on United States Fish and Wildlife Service lands."

The National Wildlife Refuge System of the USFWS manages 573 national wildlife refuges across all 50 U.S. states and territories. The FWS formally acknowledged in 2022 that "… the best available science and sound professional judgement … indicates that lead ammunition and tackle have negative impacts on both wildlife and human health." The agency further stated, "We disagree with the notion that there is insufficient scientific evidence to support regulatory requirements for hunters to use lead-free ammunition."

"While the Service continues to evaluate the future of lead use in hunting and fishing on Service lands and waters, we will work with stakeholders and the public to evaluate lead use through the annual rulemaking process. In the interim, the Service does not intend to allow opportunities increasing or authorizing the new use of lead on Service lands and waters."

Regarding the use or non-use of lead ammunition and fishing tackle, the USFWS utilized a dual approach: (1) applying lead restrictions on certain refuges (via station-specific rules) and (2) voluntary incentive-based programs to use non-lead ammo and tackle on others.

(1) *Refuge-by-refuge regulatory action for public use:* Instead of a comprehensive lead ammo or tackle system ban, the Service has been addressing lead use by the public on a refuge-specific basis through the annual station-specific hunting and sport-fishing rulemakings and signaling that broader lead-free adoption is a long-term goal. For example, the Service has put in place a lead-free ammunition requirement for newly opened elk hunting at four refuges in North Dakota.

(2) *Voluntary/incentive program approach:* USFWS is also running and expanding voluntary lead-free ammunition incentive pilots (rebates/outreach) at selected refuges as a non-regulatory pathway to reduce lead use while gathering data and stakeholder input. The program was piloted in 2024 and expanded for 2025-26. See U.S. Fish and Wildlife Service.

VIII. Conclusions

Lead ammunition remains one of the last widely tolerated sources of intentional lead release into the environment, despite overwhelming evidence of harm to wildlife, domestic animals, ecosystems, and human health. As this report demonstrates, lead-based hunting ammunition contaminates game meat, poisons scavengers and predators, disrupts ecological processes, and exposes millions of American hunters, their families, and food-insecure non-hunting communities who consume donated venison to unnecessary health risks. These impacts are well documented across multiple scientific disciplines and mirror the historical harms that led the United States to ban lead from gasoline, paint, plumbing, and other consumer products.

Conservation-minded hunters who are using lead ammunition or improperly disposing of animal remains may be uninformed about this issue, rather than indifferent to the deleterious impacts lead ammunition can have on non-target organisms. On the other hand, lead ammunition use continues among some hunters who are dismissive, unconvinced, or mistrustful of lead's dangers or who believe that non-lead ammunition campaigns are part of an anti-hunting agenda.

Crucially, these plumbism harms from lead ammunition are now avoidable. Safe, effective, and widely available non-lead ammunition alternatives now exist for virtually all hunting applications, offering comparable ballistic performance at modest additional cost. Where mandatory or well-designed transition programs have been implemented, reductions in lead exposure among wildlife and humans have followed within just a few hunting seasons. The continued use of lead ammunition is therefore not a technological necessity, but a policy and awareness failure.

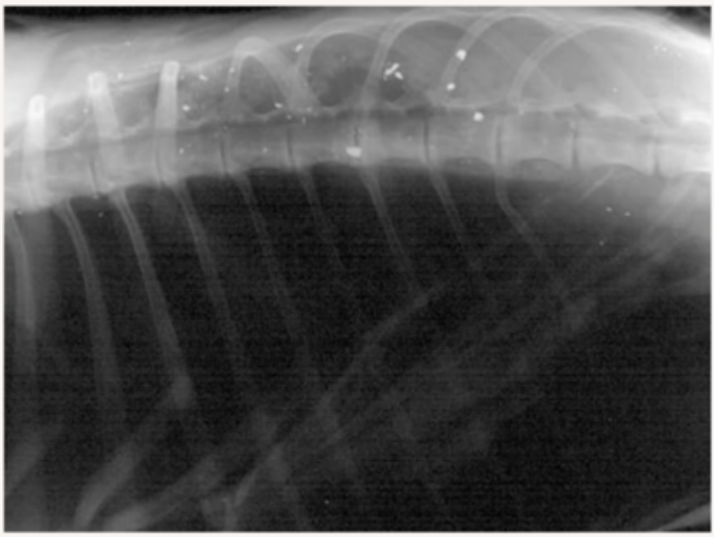
Phasing out lead ammunition for hunting represents a clear opportunity for primary prevention by protecting wildlife, safeguarding public health, and sustaining ecosystems without compromising hunting effectiveness or tradition. Given the strength and consistency of the evidence, the continued discharge of lead into the environment through hunting is neither scientifically defensible nor ethically justified. Replacing lead ammunition with non-toxic alternatives is a practical, proven, and overdue step toward healthier humans, resilient wildlife populations, and functioning ecosystems. Given the failure of voluntary attempts to reduce hunting lead ammunition use, policies and laws tightly regulating and eventually banning lead ammunition at the state and federal levels will most likely result in the best health outcomes for hunters and their families, animals, and ecosystems.

Addendum of images

Traditional lead bullet fragmentation on entry

An assortment of lead bullets showing shot fracturing next to similar fired copper variants

Copper bullet on entry showing zero fragmentation



X-ray showing presence of lead bullet fragments in deer backstrap.

Images from https://huntingwithnonlead.org

The most common hunting bullet is a lead core with a copper jacket. When an animal is shot, millions of sub-microscopic bullet fragments are dispersed throughout the carcass. This fragmentation occurs regardless of where the animal is shot, but there is more lead fragmentation if the bullet strikes a hard material such as bone. Pb particles with small surface areas increase bioavailability and make detection more difficult.

According to industry estimates, about 95 percent of the 10 billion to 13 billion rounds of ammunition purchased every year in the United States contain lead, which primarily comes from recycled car batteries. These bullets are often jacketed by a harder metal like copper or steel (Urbina 2018).

Radiograph (X-ray) showing bullet fragmentation in a deer carcass. The “white spots” are bullet fragments. Many lead fragments are microscopic and are undetectable during butchering or when the venison is eaten.

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Figure from: Arnemo JM, 2022. “Lead ammunition used by hunters has us all in its sights.” Outreach, Inland Norway University of Applied Sciences.

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"There is an urgent need to end a major source of lead for animals and humans: spent lead bullets and shotgun pellets. Notably, production of lead-based ammunition in the United States accounted for >69,000 metric tons consumed in 2012; this is second only to the amount of lead used to manufacture storage batteries. However, there are few regulations regarding the release of lead into the environment through discharge of lead-based ammunition. For other major categories of lead consumption, such as lead batteries and sheet lead/lead pipes, environmental discharge and disposal are regulated. Therefore, lead-based ammunition is the greatest largely unregulated source of lead that is knowingly discharged into the environment in the United States."

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"Copper bullets fly plenty flat enough for the ranges most hunters actually shoot and perform wonderfully. If you have a choice, shoot 'em if you like 'em. If you don't have a choice, just understand how they work and why they're different from our traditional lead-core bullets.

Either way, you can use them with confidence — but not always with the exact same shots you'd consider for cup-and-core (copper jacketed lead) bullets."

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This is the most comprehensive literature review on bullet fragments in game meat; cites 308 references of this topic ever published; 308 references cited.
"Despite the extensive data on the toxicity of lead (Pb), game meat represents one of the last uncontrolled sources of Pb exposure for humans. Conflicts of interest among different hunting stakeholders slow the implementation of legal measures to restrict the use of Pb in rifle bullets. ... This thesis aimed to systematically investigate the food safety implications of the use of Pb-based and alternative hunting rifle bullets through a multi-stage approach across primary production, meat processing, and game meat at the consumer level."

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" No rational deliberation about the use of lead-based ammunition can ignore the overwhelming evidence for the toxic effects of lead, or that the discharge of lead bullets and shot into the environment poses significant risks of lead exposure to humans and wildlife. Given the availability of non-lead ammunition for shooting and hunting, the use of lead-based ammunition that introduces lead into the environment can be reduced and eventually eliminated. This seems to be a reasonable and equitable action to protect the health of humans and wildlife."

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"Now, over 30 years after the first copper bullets began spiraling down rifle bores, hunters can find non-lead projectiles that will topple animals from prairie dogs to cape buffalo. Some bullets even deliver bone-shattering performance to 600 yards and beyond … The reasons for switching to non-lead are numerous: excellent weight retention and penetration, consistent expansion, and less risk of lead fragments ending up on dinner plates and in the bellies of scavengers. … Making the switch makes changing ammunition sound like a bigger deal than it usually is. For most hunters who shoot typical distances with a common cartridge, it's as simple as buying a box of non-lead ammunition, sighting in, and then going hunting. … The cost of non-lead has come down in recent years as the overall cost of ammunition has gone up."

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Discusses the human health risks from hunted game meat donated to food banks across the United States

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