I. Scientific Consensus

Here is a consensus opinion signed by many scientific leaders in this field, published by the University of California, on the topic of the dangers of lead ammunition, signed by 30 experts from great Universities :

Health Risks from Lead-Based Ammunition in the Environment:
A Consensus Statement of Scientists
Published by the University of California, escholarship, March 22, 2013

We, the undersigned, with scientific expertise in lead and environmental health, endorse the overwhelming scientific evidence on the toxic effects of lead on human and wildlife health. In light of this evidence, we support the reduction and eventual elimination of lead released to the environment through the discharge of lead-based ammunition, in order to protect human and environmental health.
1) Lead is one of the most well-studied of all anthropogenic toxins and there is overwhelming scientific evidence that demonstrates:
a) Lead is toxic to multiple physiological systems in vertebrate organisms, including the central and peripheral nervous, renal, cardiovascular, reproductive, immune, and hematologic systems. Lead is also potentially carcinogenic; lead is officially recognized as a carcinogen and reproductive toxin in California, and the International Agency for Research on Cancer, the National Toxicology Program, and the US Environmental Protection Agency have identified lead as likely to be carcinogenic to humans.
b) There is no level of lead exposure to children known to be withoutdeleterious effects (CDC, 2012). Exposure in childhood to even slightly elevated levels of lead produce lasting neurological deficits in intelligence and behavior.
c) Lead is also known to be toxic across different vertebrate organisms, including mammalian and avian species.

2) Lead-based ammunition is likely the greatest, largely unregulated source of lead knowingly discharged into the environment in the United States. In contrast, other significant sources of lead in the environment, such as leaded gasoline, lead-based paint, and lead-based solder, are recognized as harmful and have been significantly reduced or eliminated over the past 50 years.
a) Lead-based ammunition production is the second largest annual use of lead in the United States, accounting for over 60,000 metric tons consumed in 2012, second only to the consumption of lead in the manufacture of storage batteries (USGS, 2013).
b) The release of toxic lead into the environment via the discharge of lead-based ammunition is largely unregulated. Other major categories of lead consumption, such as leaded batteries and sheet lead/lead pipes, are regulated in their environmental discharge/disposal.

3) The discharge of lead-based ammunition and accumulation of spent lead-based ammunition in the environment poses significant health risks to humans and wildlife. The best available scientific evidence demonstrates:
a) The discharge of lead-based ammunition substantially increases environmental lead levels, especially in areas of concentrated shooting activity (USEPA ISA for Lead draft report, 2012).
b) The discharge of lead-based ammunition is known to pose risks of elevated lead exposure to gun users (NRC, 2012).
c) Lead-based bullets used to shoot wildlife can fragment into hundreds of small pieces, with a large proportion being sufficiently small to be easily ingested by scavenging animals or incorporated into processed meat for human consumption (Pauli and Burkirk, 2007; Hunt et al., 2009; Knott et al., 2010).
d) Lead-based ammunition is a significant source of lead exposure in humans that ingest wild game (Hanning et al., 2003; Levesque et al., 2003; Johansen et al., 2006; Tsuji et al., 2008), and hunters consuming meat shot with lead-based ammunition have been shown to have lead pellets/fragments in their gastrointestinal tract

(Carey, 1977;Reddy, 1985).
e) Lead poisoning from ingestion of spent lead-based ammunition fragments poses aserious and significant threat to California wildlife.

i. Spent lead-based ammunition is the principal source of lead exposure to the endangered California condor, and lead poisoning in condors is preventing their successful recovery in the wild (Church et al., 2006; Woods et al., 2007; Green et al., 2008; Parish et al., 2009; Rideout et al., 2012; Finkelstein et al., 2012).

ii. Many other wild scavenging species, such as golden eagles, bald eagles, ravens, turkey vultures, and pumas are known to be exposed to and affected by lead (Wayland and Bollinger, 1999; Clark and Scheuhammer, 2003; Fisher et al., 2006; Craighead and Bedrosian, 2008; Stauber et al., 2010; Kelly and Johnson, 2011; Burco et al., 2012).

Based on overwhelming evidence for the toxic effects of lead in humans and wildlife, even at very low exposure levels, convincing data that the discharge of lead-based ammunition into the environment poses significant risks of lead exposure to humans and wildlife, and the availability of non-lead alternative products for hunting (Thomas, 2013), we support reducing and eventually eliminating the introduction of lead into the environment from lead-based ammunition.

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A few abstracts from scientific publications or studies for further reading.

II. The residual lead in game using standard hunting practices:

Determining tissue-lead levels in large game mammals harvested with lead bullets: human health concerns. Bull Environ Contam Toxicol. 2009 Apr;82(4):435-9. Tsuji LJ[1], Wainman BC, Jayasinghe RK, VanSpronsen EP, Liberda EN.

Abstract. Recently, the use of lead isotope ratios has definitively identified lead ammunition as a source of lead exposure for First Nations people, but the isotope ratios for lead pellets and bullets were indistinguishable. Thus, lead-contaminated meat from game harvested with lead bullets may also be contributing to the lead body burden; however, few studies have determined if lead bullet fragments are present in big game carcasses. We found elevated tissue-lead concentrations (up to 5,726.0 microg/g ww) in liver (5/9) and muscle (6/7) samples of big game harvested with lead bullets and radiographic evidence of lead fragments. Thus, we would advise that the tissue surrounding the wound channel be removed and discarded, as this tissue may be contaminated by lead bullet fragments.

Lead bullet fragments in venison from rifle-killed deer: potential for human dietary exposure. PLoS One. 2009;4(4):e5330. Hunt WG[1], Watson RT, Oaks JL, Parish CN, Burnham KK, Tucker RL, Belthoff JR, Hart G.

Abstract. Human consumers of wildlife killed with lead ammunition may be exposed to health risks associated with lead ingestion. This hypothesis is based on published studies showing elevated blood lead concentrations in subsistence hunter populations, retention of ammunition residues in the tissues of hunter-killed animals, and systemic, cognitive, and behavioral disorders associated with human lead body burdens once considered safe. Our objective was to determine the incidence and bioavailability of lead bullet fragments in hunter-killed venison, a widely-eaten food among hunters and their families. We radiographed 30 eviscerated carcasses of White-tailed Deer (Odocoileus virginianus) shot by hunters with standard lead-core, copper-jacketed bullets under normal hunting conditions. All carcasses showed metal fragments (geometric mean = 136 fragments, range = 15-409) and widespread fragment dispersion. We took each carcass to a separate meat processor and fluoroscopically scanned the resulting meat packages; fluoroscopy revealed metal fragments in the ground meat packages of 24 (80%) of the 30 deer; 32% of 234 ground meat packages contained at least one fragment. Fragments were identified as lead by ICP in 93% of 27 samples. Isotope ratios of lead in meat matched the ratios of bullets, and differed from background lead in bone. We fed fragment-containing venison to four pigs to test bioavailability; four controls received venison without fragments from the same deer. Mean blood lead concentrations in pigs peaked at 2.29 microg/dL (maximum 3.8 microg/dL) 2 days following ingestion of fragment-containing venison, significantly higher than the 0.63 microg/dL averaged by controls. We conclude that people risk exposure to bioavailable lead from bullet fragments when they eat venison from deer killed with standard lead-based rifle bullets and processed under normal procedures. At risk in the U.S. are some ten million hunters, their families, and low-income beneficiaries of venison donations.

III. The impact of lead ammo on Condors and Eagles.

The PNAS article below explains how we know it is bullets causing the lead poisoning: they use isotope analysis in live birds suffering from lead poisoning, and lead bullet fragments in poisoned condors to demonstrate it, and bullets are almost always the culprit.

Lead poisoning and the deceptive recovery of the critically endangered California condor. Proc Natl Acad Sci U S A. 2012 Jul 10;109(28):11449-54. Finkelstein ME, Doak DF, George D, Burnett J, Brandt J, Church M, Grantham J, Smith DR.

Abstract. Endangered species recovery programs seek to restore populations to self-sustaining levels. Nonetheless, many recovering species require continuing management to compensate for persistent threats in their environment. Judging true recovery in the face of this management is often difficult, impeding thorough analysis of the success of conservation programs. We illustrate these challenges with a multidisciplinary study of one of the world's rarest birds-the California condor (Gymnogyps californianus). California condors were brought to the brink of extinction, in part, because of lead poisoning, and lead poisoning remains a significant threat today. We evaluated individual lead-related health effects, the efficacy of current efforts to prevent lead-caused deaths, and the consequences of any reduction in currently intensive management actions. Our results show that condors in California remain chronically exposed to harmful levels of lead; 30% of the annual blood samples collected from condors indicate lead exposure (blood lead ≥ 200 ng/mL) that causes significant subclinical health effects, measured as >60% inhibition of the heme biosynthetic enzyme δ-aminolevulinic acid dehydratase. Furthermore, each year, ~20% of free-flying birds have blood lead levels (≥450 ng/mL) that indicate the need for clinical intervention to avert morbidity and mortality. Lead isotopic analysis shows that lead-based ammunition is the principle source of lead poisoning in condors. Finally, population models based on condor demographic data show that the condor's apparent recovery is solely because of intensive ongoing management, with the only hope of achieving true recovery dependent on the elimination or substantial reduction of lead poisoning rates.

Lead in ammunition: a persistent threat to health and conservation. Ecohealth. 2013 Dec;10(4):455-64. Johnson CK, Kelly TR, Rideout BA.

Abstract. Many scavenging bird populations have experienced abrupt declines across the globe, and intensive recovery activities have been necessary to sustain several species, including the critically endangered California condor (Gymnogyps californianus). Exposure to lead from lead-based ammunition is widespread in condors and lead toxicosis presents an immediate threat to condor recovery, accounting for the highest proportion of adult mortality. Lead contamination of carcasses across the landscape remains a serious threat to the health and sustainability of scavenging birds, and here we summarize recent evidence for exposure to lead-based ammunition and health implications across many species. California condors and other scavenging species are sensitive indicators of the occurrence of lead contaminated carcasses in the environment. Transdisciplinary science-based approaches have been critical to managing lead exposure in California condors and paving the way for use of non-lead ammunition in California. Similar transdisciplinary approaches are now needed to translate the science informing on this issue and establish education and outreach efforts that focus on concerns brought forth by key stakeholders.

Here is an example of a story from the Ventana condor restoration project, and the link includes a page of links including non-lead ammo retailors.
http://www.ventanaws.org/species_condors_lead/

The literature linking lead poisoning in condors to lead from spent ammunition is strong. In fact, we have contributed some of it. But what really convinces us is the direct evidence we have seen during our 15 years of managing the central California Condor population. As a recent example, a 10 year-old male condor (#318, Figure 1) died in November 2012 after ingesting a lead .22 caliber bullet, presumably while feeding on a carcass. The bird was found in San Benito County barely alive and unable to feed or use its legs to stand. Despite valiant efforts, veterinarians could not save him. Cause of death, through necropsy, was determined to be lead toxicosis. A radiograph showed multiple metal fragments and a bullet-shaped object in the digestive tract (Figure 2). The object was removed and determined to be a .22 caliber lead bullet (Figure 3).

The death of condor #318 is a huge loss for the central California population. This bird was a breeding male, the first at Pinnacles National Park in more than 100 years. With only a few breeding pairs established in the region, his loss leaves a void which might not be quickly filled. His surviving mate has left the breeding territory, and it is not clear if and when she will pair with another condor and breed again. The loss of even a small number of breeding pairs, and the offspring they produce, puts the entire population at risk.

Lead exposure in bald eagles from big game hunting, the continental implications and successful mitigation efforts. PLoS One. 2012;7(12):e51978. Bedrosian B, Craighead D, Crandall R.

Abstract. Studies suggest hunter discarded viscera of big game animals (i.e., offal) is a source of lead available to scavengers. We investigated the incidence of lead exposure in bald eagles in Wyoming during the big game hunting season, the influx of eagles into our study area during the hunt, the geographic origins of eagles exposed to lead, and the efficacy of using non-lead rifle ammunition to reduce lead in eagles. We tested 81 blood samples from bald eagles before, during and after the big game hunting seasons in 2005-2010, excluding 2008, and found eagles had significantly higher lead levels during the hunt. We found 24% of eagles tested had levels indicating at least clinical exposure (>60 ug/dL) during the hunt while no birds did during the non-hunting seasons. We performed driving surveys from 2009-2010 to measure eagle abundance and found evidence to suggest that eagles are attracted to the study area during the hunt. We fitted 10 eagles with satellite transmitters captured during the hunt and all migrated south after the cessation of the hunt. One returned to our study area while the remaining nine traveled north to summer/breed in Canada. The following fall, 80% returned to our study area for the hunting season, indicating that offal provides a seasonal attractant for eagles. We fitted three local breeding eagles with satellite transmitters and none left their breeding territories to feed on offal during the hunt, indicating that lead ingestion may be affecting migrants to a greater degree. During the 2009 and 2010 hunting seasons we provided non-lead rifle ammunition to local hunters and recorded that 24% and 31% of successful hunters used non-lead ammunition, respectively. We found the use of non-lead ammunition significantly reduced lead exposure in eagles, suggesting this is a viable solution to reduce lead exposure in eagles.

IV. Lead dangers for families of hunters

Health and Environmental Risks from Lead-based Ammunition: Science Versus Socio-Politics. Ecohealth. 2016; 13(4): 618–622. Jon M. Arnemo, Oddgeir Andersen, Sigbjørn Stokke, Vernon G. Thomas, Oliver Krone, Deborah J. Pain, and Rafael Mateo

Snippets from this article:
According to the World Health Organization (WHO 2015) and the European Food Safety Authority (EFSA 2013), there are no defined safe levels of lead intake in humans. The toxic effects of lead are numerous and largely irreversible. Of greatest concern is the effect on the nervous system of fetuses and children. The adverse effect of lead on children's intellectual function is well established, especially the decline in IQ and loss of cognitive

skills (Lanphear et al. 2005; Bellinger 2008; Grandjean and Landrigan 2014), which may have huge economic effects on societies especially when populations are affected. There is a strong positive relationship between childhood lead exposure and subsequent aggressive crime (Taylor et al. 2016). Additionally, Menke et al. (2006) showed that increased cardiovascular mortality in adults occurs at substantially lower blood lead levels than previously reported. Despite the marked decrease in blood lead levels in the general population, low-level environmental lead exposure remains a major public health problem and has been termed a "silent killer" (Nawrot and Staessen 2006). People who frequently consume game shot with lead ammunition are at risk from high dietary lead exposure, e.g., Greenlanders had mean blood lead levels four to ten times higher than the EFSA benchmark dose modeling (BMDL) thresholds for developmental neurotoxicity in children and for chronic kidney disease in adults (Johansen et al. 2006)...

A number of European food safety agencies now advise children and women of pregnancy age to avoid eating game shot with lead (Knutsen et al. 2015).

In the USA, where non-toxic shot has been required nation-wide for waterfowl hunting since 1991, waterfowl mortality from lead shot ingestion is considered to have declined considerably (Anderson et al. 2000; Samuel and Bowers 2000).

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World Health Organization on lead in humans:

Young children are particularly vulnerable because they absorb 4–5 times as much ingested lead as adults from a given source.

There is no known safe blood lead concentration. But it is known that, as lead exposure increases, the range and severity of symptoms and effects also increases. Even blood lead concentrations as low as 5 µg/dl, once thought to be a "safe level", may result in decreased intelligence in children, behavioural difficulties and learning problems.

Snippets extracted from a report for the US Dept of Health and Human Services and CDC, conducted by the Wisconsin Department of Health and Family Service

https://www.atsdr.cdc.gov/hac/pha/LeadFragmentsinVenison/Venison%20and%20Lead%20HC%20110408.pdf

Bullet fragments in rifle-killed deer have led to concerns about risks of lead exposure associated with human consumption of venison. The presence of lead bullet fragments in venison intended for human consumption has been confirmed, and indicates a completed exposure pathway for the ingestion of lead-contaminated meat… The purpose of this report is to determine the health implications of eating lead-contaminated venison, based upon laboratory analysis of venison samples

Wisconsin ranks near the top of all states in the popularity and economic importance of White-tailed deer hunting (WDNR 1998, 2007). Deer hunting is an important part of Wisconsin recreation and tourism, and is a long-held tradition in many families.

Venison donated to charity food pantries is a particular concern, as this program is an important outlet for harvested deer while also serving a population having
a greater than average exposure to lead in the home. In Wisconsin, food pantry venison is not regulated, unlike commercial and retail meats, which must be inspected before
and after processing. The 2006 Wisconsin deer harvest was approximately 500,000 deer (WDNR 2007). From these, about 400,000 pounds of venison were donated to food pantries via 126 meat processors participating in the Department of Natural Resources (WDNR) program.

One hundred eighty three (183) nominal one-pound ground venison samples were collected from freezer stocks of 5 food pantries and 6 meat processors located around the state ("pantry samples").

One hundred fourteen (114) additional samples of ground and whole cut venison were solicited from WDNR employees in order to more directly sample the hunter population ("hunter samples").

Lead was ultimately detected in 30 of 199 commercially processed samples, a prevalence of 15%. The mean lead concentration found among those pantry samples positive for lead was 15.9 mg/kg ± 32.5 std. dev… 81% of children who eat this meat 2 times a month are predicted to have lead levels in blood over 10 ug/dL, aveage 15 ug/dL

Lead was detected in 8 of 98 hunter samples, a prevalence of 8%. The mean lead concentration found among those hunter samples positive for lead was 21.8 mg/kg ± 67.1 std. dev… 90% of children who eat this meat with this level of lead 2 times per month are expected to have blood levels greater than 10, average 18 ug/dL.

V. Thoughts for hunters regarding changing ammunition

Performance of lead-free versus lead-based hunting ammunition in ballistic soap. PLoS One. 2014 Jul 16;9(7):e102015. Gremse F, Krone O, Thamm M, Kiessling F, Tolba RH, Rieger S, Gremse C

BACKGROUND: Lead-free hunting bullets are an alternative to lead-containing bullets which cause health risks for humans and endangered scavenging raptors through lead ingestion. However, doubts concerning the effectiveness of lead-free hunting bullets hinder the wide-spread acceptance in the hunting and wildlife management community.
METHODS: We performed terminal ballistic experiments under standardized conditions with ballistic soap as surrogate for game animal tissue to characterize dimensionally stable, partially fragmenting, and deforming lead-free bullets and one commonly used lead-containing bullet. The permanent cavities created in soap blocks are used as a measure for the potential wound damage. The soap blocks were imaged using computed tomography to assess the volume and shape of the cavity and the number of fragments. Shots were performed at different impact speeds, covering a realistic shooting range. Using 3D image segmentation, cavity volume, metal fragment count, deflection angle, and depth of maximum damage were determined. Shots were repeated to investigate the reproducibility of ballistic soap experiments.
RESULTS: All bullets showed an increasing cavity volume with increasing deposited energy. The dimensionally stable and fragmenting lead-free bullets achieved a constant conversion ratio while the deforming copper and lead-containing bullets showed a ratio, which increases linearly with the total deposited energy. The lead-containing bullet created hundreds of fragments and significantly more fragments than the lead-free bullets. The deflection angle was significantly higher for the dimensionally stable bullet due to its tumbling behavior and was similarly low for the other bullets. The deforming bullets achieved higher reproducibility than the fragmenting and dimensionally stable bullets.

CONCLUSION: The deforming lead-free bullet closely resembled the deforming lead-containing bullet in terms of energy conversion, deflection angle, cavity shape, and reproducibility, showing that similar terminal ballistic behavior can be achieved. Furthermore, the volumetric image processing allowed superior analysis compared to methods that involve cutting of the soap blocks.

Lead-Free Hunting Rifle Ammunition: Product Availability, Price, Effectiveness, and Role in Global Wildlife Conservation. Ambio. 2013 Oct; 42(6): 737–745. Vernon George Thomas.

Proposals to end the use of lead hunting ammunition because of the established risks of lead exposure to wildlife and humans are impeded by concerns about the availability, price, and effectiveness of substitutes. The product availability and retail prices of different calibers of lead-free bullets and center-fire rifle ammunition were assessed for ammunition sold in the USA and Europe. Lead-free bullets are made in 35 calibers and 51 rifle cartridge designations. Thirty-seven companies distribute internationally ammunition made with lead-free bullets. There is no major difference in the retail price of equivalent lead-free and lead-core ammunition for most popular calibers. Lead-free ammunition has set bench-mark standards for accuracy, lethality, and safety. Given the demonstrated wide product availability, comparable prices, and the effectiveness of high-quality lead-free ammunition, it is possible to phase out the use of lead hunting ammunition world-wide, based on progressive policy and enforceable legislation.

Comparison of the lethality of lead and copper bullets in deer control operations to reduce incidental lead poisoning; field trials in England and Scotland. Conservation Evidence (2009) 6, 71-78. Jeff Knott, Jo Gilbert, Rhys E. Green, David G. Hoccom.

Legislative controls on the use of lead gunshot over wetland areas have been introduced in many countries, including the UK, in order to reduce lead poisoning in waterfowl following ingestion of spent shot. Effective alternatives to lead shot are widely available. However, there is evidence that the problem also affects wildlife in terrestrial ecosystems and that lead bullets are a source of contamination for scavenging birds and mammals. With this in mind, copper bullets were trialled at three varied UK sites during deer control operations undertaken to achieve nature conservation objectives. Their accuracy and killing power were recorded and compared to that of traditional lead bullets. No significant differences were found in accuracy or killing power. These results, coupled with experience elsewhere, suggest that copper bullets are a viable alternative to lead bullets. If this is confirmed in all situations, we consider further restrictions on the use of lead ammunition, designed to encourage a switch to non-toxic ammunition across terrestrial habitats, to be a proportionate response to the problems associated with lead ingestion.

A good source of further information:

http://www.huntingwithnonlead.org/scientific_evidence.html