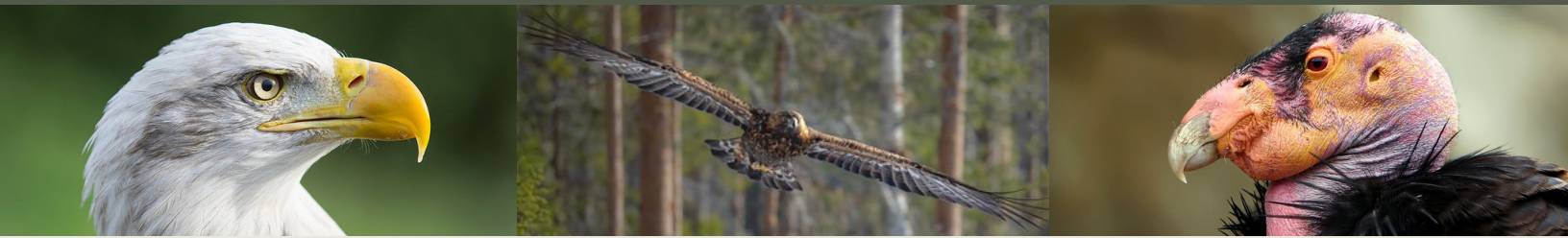




THE
WILDLIFE
SOCIETY

Lead (Pb) and Wildlife

Lead (Pb) is one of the world's most widely used industrial metals. Though naturally occurring, lead has no known functional or beneficial role in biological systems and is recognized as a potent, broad-spectrum toxicant to both humans and wildlife.¹ The effects of lead poisoning vary by species, health, and age of an individual, but even trace levels of exposure can have serious and potentially irreversible health effects.²



For some species like bald (*Haliaeetus leucocephalus*) and golden (*Aquila chrysaetos*) eagles, and the federally endangered California condor (*Gymnogyps californianus*), lead exposure has population-level effects. Credit (left to right): Karen Bullock, Sue Cro, and Isaac Hsieh.

Lead in Ammunition & Fishing Tackle

Despite well-documented adverse effects to wildlife and humans, use of lead ammunition and fishing tackle remains widespread.^{4,5} The most significant hazard to wildlife results from direct ingestion of lead through the consumption of prey or carrion containing abandoned fishing tackle or fragmented lead ammunition.³ Many types of lead rifle bullets fragment into small pieces when shot into an animal.⁶ These fragments end up in carrion that wildlife scavenge, and meat that humans consume.⁷

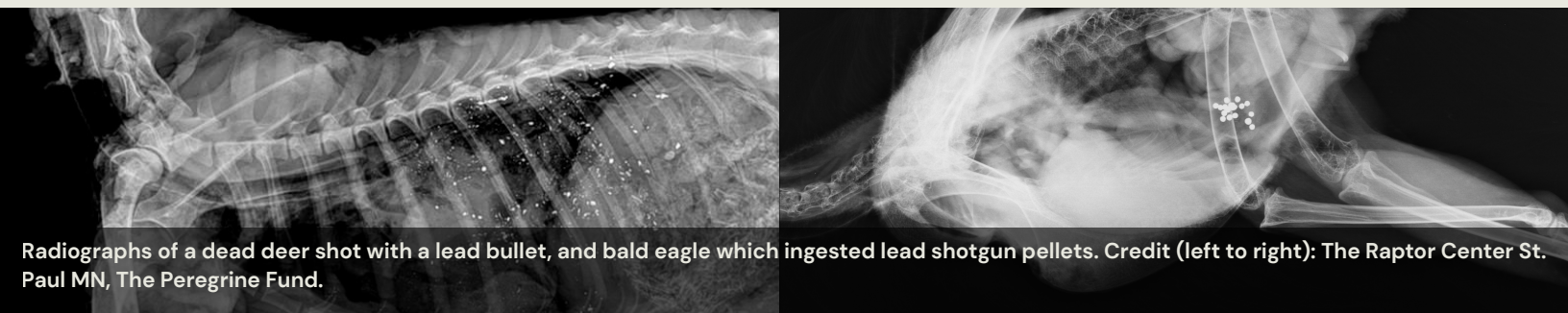
Over 130 species of wildlife in North America are affected by lead ingestion, with lead-caused mortality in some species reaching tens of thousands of individuals per year.⁸

Nearly half of North American bald and golden eagles show signs of acute lead poisoning.⁹ Although further research is needed on population-level effects for some species, minimizing or restricting the use of lead ammunition and fishing tackle will benefit a variety of species including waterbirds, scavenging birds, upland birds and other species.^{3,10}

EFFECTS OF LEAD EXPOSURE ON WILDLIFE³

Low Level	High Level
Organ & tissue damage	Nervous system damage
Immune system, reproductive, and neurological impairment	Paralysis
High blood pressure	Death

From TWS Journals: A non-lead ammo distribution program in southeast Wyoming offset the fatality of an estimated 3.84 (95% CI = 1.06–23.72) golden eagles across 2 hunting seasons.¹³



Radiographs of a dead deer shot with a lead bullet, and bald eagle which ingested lead shotgun pellets. Credit (left to right): The Raptor Center St. Paul MN, The Peregrine Fund.

Brief history of lead regulations in North America

- Late 1800's** ▶ Lead poisoning documented in waterfowl at hunting sites in TX & NC
- 1900–1970** ▶ Lead recognized as widespread hazard and mortality factor in waterfowl populations
- 1970–1980** ▶ Regulations of lead begins in some jurisdictions within the U.S. & Canada
- 1980S** ▶ U.S. monitoring and phase out of lead ammunition for hunting waterfowl and coots
- 1991** ▶ Use of lead ammunition for waterfowl hunting officially prohibited in U.S.
- 1995** ▶ USFWS begins requiring non-lead shot to hunt small game on federal lands
- 1997** ▶ Parks Canada bans use of small lead sinkers in all national parks and wildlife areas
- 1999** ▶ Canada Prohibits use of lead ammunition for hunting all migratory game birds
- Early 2000s** ▶ Various U.S. states restrict lead ammunition (IA, MN) and fishing tackle (NH, ME, NY, VT)
- 2019** ▶ California prohibits use of lead ammunition for all hunting

Effective, nontoxic alternatives to lead ammunition are available for all gauges of modern shotguns, as well as rifle bullets for hunting large game.¹¹ Transitioning from the use of toxic lead for hunting, fishing, and shooting sports requires collaboration and cooperative management among all affected stakeholders and must recognize the crucial role that hunters and anglers play in wildlife conservation.¹² This will likely require a phased-in approach that focuses on targeted education and the removal of potential barriers to adoption, including the costs and availability of nontoxic alternatives.¹²



Copper

Lead

Lead bullets fragment into hundreds of small pieces, while copper bullets do not.
Credit: Mike McTee, USGS



From TWS Journals: A study of hunter education instructors in New York showed strong opposition to legislative or regulatory bans on lead ammo. Instructors “strongly believed that education and effective communication offer the best path forward.”¹⁴

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