



Effects of Lead (Pb) Exposure on Wildlife

Lead (Pb) is one of the world's most widely used industrial metals due to its unique physical properties and widespread availability. 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 Lead's adverse toxicological consequences vary depending on the species, health, and age of an individual, but even at trace levels of exposure, can have a variety of sub-lethal, and potentially irreversible, health effects.²

How Lead Exposure Affects Wildlife³

- **Toxic Level Lead Exposure Can Cause:**
 - Damage to nervous system
 - Paralysis
 - Death
- **Low-Level Lead Exposure Can Cause:**
 - Damage to organs & tissues
 - Damage to immune system
 - Reproductive impairment
 - Neurological impairment
 - High blood pressure



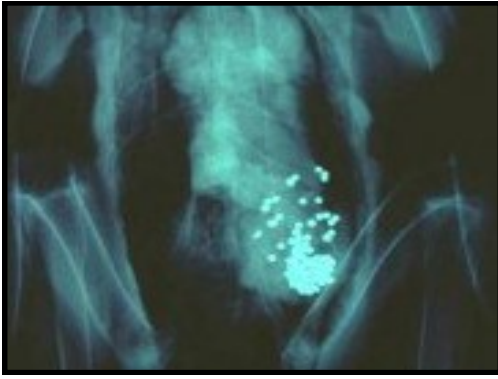
For some species, like the federally endangered California condor, lead exposure has population-level effects that threaten the long-term viability of the species⁴ (Credit: USFWS).

Lead in Ammunition & Fishing Tackle

Despite well-documented adverse effects to humans and wildlife, **lead use in ammunition and fishing tackle remains widespread.**⁵ While lead in this form provides only a small fraction of total anthropogenic releases, it can have significant effects on some wildlife species.⁶ Under some circumstances, elemental lead from spent ammunition and lost fishing tackle can leech into water and sediment, becoming bioavailable for plants and animals and creating environmental contaminant problems.³ The most significant hazard to wildlife, however, results from the direct ingestion of lead through the consumption of prey containing **fragmented lead ammunition or abandoned fishing tackle.**³

Over **130 species in North America** are affected by lead ingestion, with lead-caused mortality in some species reaching **tens of thousands of individuals per year.**⁷ For most of these species, however, there is little to no assessment of the effect of this lead-caused mortality on population levels.⁷ To better understand the magnitude and extent of this problem, more targeted, broad-scale monitoring of lead poisoning incidents are needed; but in many settings, current science sufficiently indicates that minimizing or restricting the use of lead ammunition and fishing tackle will benefit a variety of wildlife species, including waterbirds, scavenging birds, upland birds, and possibly other species.³

Alternatives to Lead



Lead ammunition ingested by a bald eagle scavenging on wildlife shot with lead ammunition (Credit: USGS).

Several **effective, nontoxic alternatives** to lead ammunition are now available in North America.⁸ Nontoxic ammunition exists for all gauges of modern shotguns, as well as nontoxic rifle bullets for hunting large game.⁹

Removal of lead from hunting, fishing, and shooting, however, will require **collaboration and cooperative management** among all affected stakeholders and must recognize the crucial role that hunters and anglers play in wildlife management/conservation.¹⁰ 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.¹⁰

Historical Perspective of Lead Regulations in North America

- **Late 1800's:** Lead poisoning documented in waterfowl at hunting sites in TX and NC
- **Mid-1900's:** Lead recognized as a widespread hazard and mortality factor in waterfowl populations
- **1970:** Hazards of lead fishing sinkers to waterfowl documented.
- **1970–1980:** Regulation of lead begins in some jurisdictions within the U.S. & Canada
- **1983–1985:** USFWS* begins monitoring impacts of lead exposure on waterfowl
- **1986:** U.S. begins 5-year phase-out of lead ammunition in hunting waterfowl and coots
- **1991:** Use of lead ammunition in waterfowl hunting officially prohibited in U.S.
- **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
- **2010:** U.S. Military begins phasing out lead ammunition—will fully replace lead by 2018
- **2013:** California adopts plan to ban the use of lead ammunition statewide by 2019

*U.S. Fish and Wildlife Service

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