



Effects of Lead on Wildlife

Review of Recent Literature and
Comments from the
US Fish and Wildlife Service



Lead ammunition and fishing tackle have long been known to negatively impact wildlife. Though effects on California Condors are well-established, numerous other species of various taxa have been documented as heavily impacted. The US Fish and Wildlife Service (USFWS) has recently revisited its position on lead-use on public lands and is incorporating current science into its decision-making process.

Decades of research documenting the inherent risks of lead to wildlife are abundant. A Google Scholar search returned over 7,800 peer-reviewed papers on lead toxicity in wildlife dating back to 1956, and even this is far from representative. The papers cited below are a small sample of recent research which underlines the need for more aggressive lead regulation. There has been no major action taken since 1991, and the last 30 years have only confirmed what scientists and wildlife professionals have been advocating for; lead must be removed as a threat to wildlife.

Population Level Effects on Bald and Golden Eagles

► Slabe, V.A. et al. 2022. [Demographic implications of lead poisoning for eagles across North America](#). Science Vol. 375, No. 6582. This paper demonstrates that lead ammunition is negatively impacting Bald and Golden Eagles at the population level, hampering recovery and population growth. A quote from the paper is below:

“Use of lead in ammunition during hunting seasons corresponds directly, both spatially and temporally, with the feeding ecology of facultative scavengers such as bald and golden eagles, a problem that has been studied extensively. Our data show a continent-wide temporal correspondence between acute lead poisoning of eagles and the use of lead ammunition.”

Major findings include:

- Bald and Golden Eagles both had lead levels at a chronic toxicity level of those sampled
 - 47% of Bald Eagles | 46% of Golden Eagles
- Lead toxicity in Eagles is geospatially correlated with hunting
- Lead toxicity threatens Bald and Golden Eagle population growth
 - Bald Eagle: 0.8% Suppression | Golden Eagle: 3.8% Suppression

► Hanley, B.J. et al. 2022. [Environmental lead reduces the resilience of bald eagle populations](#). J. of Wildlife Management. Vol. 86, Issue 2. This paper shows significant reduction in Bald Eagle recovery from lead poisoning.

“These shifts in survival performance were further associated with a reduction in resilience for hatchling (95.4%) and breeding (81.6%) female eagles.”

► J.W. Watson and R.W. Davies. 2015. Lead, mercury, and DDE in the blood of nesting Golden Eagles in the Columbia Basin, Washington. J. of Raptor Research. 49(2):217-221.

“Toxicosis from lead (Pb) ingestion is an increasing concern for Golden Eagle (Aquila chrysaetos) populations throughout western North America (Wayland and Bollinger 1999, Bedrosian and Craighead 2009, Stauber et al. 2010, Harmata and Restani 2013). Lethal Pb toxicosis in eagles may be preceded by sublethal effects that impair mobility and feeding behavior and may lead to death from other proximate causes (e.g., vehicle strike, powerline collision).”

Effects on Other Avian Species

▶ A.G. Palmer, D. Heard, A. Alexander, J. F.X. Wellchan, J. Hernandez. 2022. Blood lead concentrations of free-ranging North Florida raptor. *J. of Wildlife Diseases*. 58(2), 409-414. *"We found lead contamination to be a common and considerable problem in Bald Eagles and vultures but not as evident in nocturnal and other diurnal raptors in North Florida. Furthermore, concentrations were highest during winter in this temperate location, suggesting a possible relationship with hunting seasons despite a lack of big game."*

▶ The Trumpeter Swan Society. 2021. Lead in the environment is a significant threat to Trumpeter Swans and other wildlife. www.trumpeterswansociety.org. *"A single split shot or sinker can kill a 30-pound swan through lead poisoning."*

▶ A.J. Specht, K.E. Kirchner, M.G. Weisskopf, M.A. Pokras. 2019. [Lead poisoning in Maine's Common Loons](#). *Sci Tot Environ*. 647: 639-644.

"Bone lead was found to be higher in loons collected from non-coastal regions. In assessing lead-related cause of death, bone lead proved more predictive than liver lead."



▶ I.J. Fisher, D.J. Pain, and V.G. Thomas. 2006. [A review of lead poisoning from ammunition sources in terrestrial birds](#). *Biological Conservation* 131:421-431.

"Fifty-nine terrestrial bird species have so far been documented to have ingested lead or suffered lead poisoning from ammunition sources, including nine Globally Threatened or Near Threatened species."



▶ Reese, J.G. 2017. [Brown Creeper \(Certia americana\) fatality exhibits signs associated with lead poisoning](#). *American Birdlife*. Vol. 66, No. 2.

-Multiple different passerine birds have been documented as experiencing effects of lead poisoning from ammunition

"This may be the first documented incidence of possible lead poisoning in the family Certhiidae of wild passerines and one with an internal tangible lead source."

▶ Grade, T., P. Campbell, et al. 2019. Lead poisoning from ingestion of fishing gear: A review April 2019. *Ambio A Journal of the Human Environment*. Vol. 48: 9.

"This paper surveys current knowledge of species poisoned by ingestion of lead fishing gear and the types of gear that have been implicated. We review the impacts of lead fishing tackle on wildlife species and human health and describe the efficacy of efforts to reduce the use of lead tackle through voluntary, educational, and regulatory approaches to encourage adoption of non-toxic fishing gear."

Lead Contamination in Mammalian Scavengers

▶ L. Brown, L. Rosabal, C. Dussault, J.A. Arnemo, B. Fuchs, A. Zedrosser, and F. Pelletier. 2022. [Lead exposure in American black bears increases with age and big game harvest density](#). *Environ Pollut*. Vol 315:120247.

"These results suggest that hunters may drive mammalian scavengers into an evolutionary trap, whereby the long-term benefits of consuming slaughter remains could be negated due to increased Pb exposure."

► T. Rogers, B. Bedrosiani, D. Craighead, H. Quigley and K. Foresman. 2009. [Lead ingestion by scavenging mammalian carnivores in the Yellowstone Ecosystem](#): The Peregrine Fund, Boise, Idaho, USA. DOI 10.4080/ilsa.2009.0121
“This preliminary evidence suggests mammalian carnivores in areas of high hunting density may exhibit the same temporal pattern of lead exposure from ingestion of rifle bullet fragments during the hunting season as avian scavengers.”



► D. Pain, R. Mateo, and R. Green. 2019. [Effects of lead from ammunition on birds and other wildlife: A review and update](#). *Ambio* 48:935-953.
“Taxa beyond birds are also affected; recent research highlights risks to mammalian scavengers and predators although this has not been extensively investigated.”

Recent Comments from the USFWS on Lead Ammunition and Fishing Tackle

Federal Register 2022. US Fish and Wildlife Service. Docket No. FWA-HQ-NWRS-2022-0055.
<https://www.regulations.gov>.

The USFWS has [recently initiated efforts](#) on nine National Wildlife Refuges to phase out lead entirely. Additionally, all Refuge lands newly opened to Hunting and Fishing will require non-lead materials. Key takeaways from the Service’s rule include:

- 1) Lead poses a threat to wildlife.
- 2) A population level impact is not required for significant rulemaking (though one does exist for Eagles and previously for waterfowl).
- 3) Purely voluntary approaches to lead reduction have not yielded significant results.
- 4) Requiring non-lead material is not significantly prohibitive to under resourced groups.