



## **Final Position Statement**

### **Lead in Ammunition and Fishing Tackle**

Lead has been used in ammunition and fishing tackle for centuries. It is an effective and inexpensive element for the manufacture of projectiles and weights. Although it is a naturally occurring element in the environment, lead has no functional or beneficial role in biological systems, and at very low levels of exposure it can be toxic, depending on the species and the health and age of an individual. At toxic levels, lead damages the nervous system, causing paralysis and eventual death; at lower levels, it is known to cause a variety of sublethal effects such as neurological damage, tissue and organ damage, and reproductive impairment.

Awareness of the hazards of lead ammunition to waterfowl and some upland game birds began in the late 1870s, while the hazards of lead fishing sinkers to waterfowl became apparent in the 1970s when lead was found to poison swans in the United Kingdom (UK). In the 1970s and 1980s, the UK and some jurisdictions within the United States (U.S.) and Canada began placing restrictions on the use of lead ammunition and fishing tackle. Today, lead from ammunition and fishing tackle provides a small fraction of total environmental releases, but this lead exists in a form that can be readily ingested by some species of wildlife.

Metallic lead can remain relatively stable and intact for decades, even centuries. However, under certain environmental conditions (e.g., acidic or basic water or soil) lead from shot, bullets, or tackle can be readily released and taken up by plants or animals, causing a range of biochemical, physiological, and behavioral effects in some species of invertebrates, fish, amphibians, reptiles, birds, and mammals. Lead that is adsorbed or incorporated into food items through the soil, as well as lead fragments in carcasses or deposited at shooting sites, is known to be consumed by some birds and small mammals, resulting in elevated lead concentrations. Ingestion by reptiles, birds, and mammals of spent ammunition and lost fishing tackle has also been documented and can cause a range of negative effects in individuals, potentially leading to population-level consequences in some species (e.g., waterfowl, eagles, condors, mourning doves, and loons), and other species where population-level thresholds are adequately described by responsible resource agencies.

From a public health perspective, exposure to lead potentially may result in a variety of human health problems, such as neurological effects and stunted growth, particularly in children. Although the extent is still unclear, recent research indicates that consumption of game taken with lead ammunition may increase blood-lead levels in humans. When lead that is imbedded in game meat becomes exposed to acid in the human stomach, this lead may then be absorbed into the system. Even if a lead pellet or bullet completely passes through an animal, a small amount of lead may be left in the tissue and may be absorbed by a person consuming the meat.

Lead poisoning related to spent ammunition and lost fishing tackle has been extensively studied in birds, and at least two studies indicate that the ban on the use of lead ammunition for hunting

waterfowl and coots in North America has successfully reduced lead exposure in waterfowl. Despite the prohibition on lead shot for waterfowl hunting, current data for raptors and avian scavengers indicate increases in lead exposure in these species, especially during hunting season. Upland game birds (e.g., doves and quail) and scavengers (e.g., vultures and eagles) have been documented to be exposed to lead, and ingestion of lead has been the limiting factor in the recovery of the California condor. Accordingly, 34 states (as of 2015) have instituted restrictions on the use of lead ammunition to minimize effects to upland game birds, eagles, and other species. The hazard of ingested lead sinkers and fishing tackle is well-documented in swans and loons, and restrictions on the sale or use of lead weights have been instituted in parts of the UK, Canada, several other countries, and five states in the U.S. (as of 2015) in order to minimize effects on swans, loons, and other potentially vulnerable species. There are only limited data on the adverse effects of lead ingestion at shooting ranges, and reproductive and mortality rates at these sites have not been adequately investigated. The U.S. Environmental Protection Agency has published “Best Management Practices for Lead at Outdoor Shooting Ranges” to reduce environmental impacts of lead deposition during target shooting, and other materials of this nature are available from the National Rifle Association and the National Shooting Sports Foundation.

Extensive effort in the development, efficacy testing, and regulation of alternatives to lead-based ammunition for hunting waterfowl, water birds, upland game birds, and big game has resulted in a number of effective nontoxic alternatives that are approved and currently available in North America and elsewhere. Several manufacturers have developed nontoxic ammunition that can be used safely in all gauges of modern shotguns, as well as nontoxic rifle bullets for hunting large game. Widespread manufacture of nontoxic shotgun and rifle ammunition has increased significantly as hunters have recognized the hazards of consuming lead in meat and the impacts of lead on non-target species. Nontoxic shot may be used in all clay target sports and is required by some shooting facilities. Substitutes for lead fishing tackle are available. A few, but not all, alternative metals in fishing tackle have been deemed safe if ingested by waterfowl and some other birds and mammals.

The policy of The Wildlife Society in regard to lead in ammunition and fishing tackle is to:

1. Recognize that lead has been known for over 100 years to be a broad-spectrum toxicant to humans and wildlife.
2. Advocate the replacement of lead-based ammunition for hunting and fishing tackle with nontoxic products, while recognizing that complete replacement may not be possible in specific circumstances.
3. Recognize that the removal of lead for hunting and fishing will require collaboration among affected stakeholders (including wildlife professionals, ammunition and tackle manufacturers, sportspersons, policymakers, and the public). It will require a phased-in regulatory approach, and involve explicit and targeted educational strategies at both the national and international levels, thereby acknowledging and supporting the crucial role that hunters and anglers play in wildlife management and conservation. Resource agencies and conservation organizations should consider collaborating to encourage voluntary phase-out of lead ammunition and fishing tackle, but if those efforts fail then these stakeholders should support regulatory removal of lead options.

4. Encourage further studies on reducing barriers to the development of nontoxic ammunition and fishing tackle, additional research that generates toxicological and environmental chemistry data, monitoring and modeling of exposure effects, and studies predicting consequences of exposure and long-term population-level effects. However, the need for additional information should not delay the educational efforts and the regulatory phasing-in of nontoxic ammunition and tackle where practicable.
5. Promote and encourage the adoption and use of best practices for target shooting at managed shooting ranges to ensure that adverse environmental impacts of lead deposition are eliminated or minimized.
6. Support continued educational efforts to promote greater public awareness and understanding of the consequences of lead exposure to wildlife populations, and emphasize the potential gains for wildlife and environmental quality from the use of nontoxic ammunition and fishing tackle.

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