



ARIZONA GAME AND FISH DEPARTMENT

MANAGING TODAY FOR WILDLIFE TOMORROW

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Condors and Lead

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- ▶ [Non-lead ammunition](#)

Lead toxicity has been identified as the leading cause of death in condors in Arizona's California condor reintroduction program, and high mortality rates are the primary obstacle to recovery of this species. Multiple condors have died of lead poisoning since 2000. Condors are trapped annually to have their blood tested for lead. Biologists began testing for lead exposure in 1999. Each year, 45 to 95 percent of the condor population tests positive for lead exposure. Chelation treatment is often required to reverse dangerously high blood lead levels. Surgery has also been necessary in the worst cases. Without these treatments, more condors likely would have died.

A number of scientific studies collectively provide strong evidence to support the hypothesis that spent lead ammunition is the primary source of lead exposure in condors. The information gained from these studies can be collectively presented as a set of scientific findings or observations, linked together to create a *logic chain*. Individually, each link in the following logic chain has been demonstrated by a scientific study, and collectively the links form a logic chain that provides strong evidence that lead ammunition is the most likely source of elevated blood lead levels in free-ranging condors.

Logic Chain Supporting Spent Ammunition as the Most Likely Source of Lead in Free-ranging Condors

- ▶ Condors are obligate scavengers, primarily of medium to large mammalian species.
- ▶ Large numbers of deer are killed within condor range, and large numbers of deer carcasses and gut piles are seasonally available within their range.
- ▶ High proportions of deer carcasses and gut piles found within condor range are contaminated with lead from spent ammunition.
- ▶ Pieces of spent ammunition have been documented within condor digestive tracts in multiple cases.
- ▶ Lead in ingested ammunition is absorbed in the digestive tract and leads to elevated blood lead levels.
- ▶ Free-flying condors have frequently been observed with elevated levels of lead in their blood, with evidence of variable lead levels and re-occurring periods of high exposure.
- ▶ Elevated blood lead levels are temporally (seasonally) associated with increased availability of hunter-killed deer carcasses and gut piles (i.e., when hunters are using lead bullets in condor foraging areas).
- ▶ To date, no other source of lead has been identified to be:

Prevalent in the geographic range of condors,
 Available to condors in concentrated form via a plausible route of ingestion,
 Available to condors in a pattern consistent with observed temporal patterns.

Additional studies have used lead isotope ratio analysis to examine the relationship between spent ammunition and lead in condors. Although isotope ratio analyses are not typically used in isolation to prove the source of contamination, they are valuable for testing hypotheses developed from other pieces of information or for ruling out potential sources of contamination. In the case of condor lead poisoning, studies using lead isotope ratio analysis have been consistent with the above logic chain. They have not ruled out ammunition as the primary source of lead in condors. In fact, no piece of evidence has contradicted this conclusion.

This collective information provides strong support for the continuation of Arizona's education and outreach program to promote a voluntary switch to non-lead ammunition by Arizona hunters.

How Can You Help?

Arizona hunters have a long tradition of wildlife conservation, and the department asks for your help in continuing this proud tradition. If you hunt within condor range in Arizona (Game Management Units 12A, 12B, 9, 10, 13A, and 13B), please use non-lead ammunition.

High performance all-copper bullets are now available in most rifle calibers. In comparison to copper-jacketed bullets with lead cores, all-copper bullets do not fragment and are far less toxic. Scavengers like the condor are less likely to ingest one large mushroomed bullet versus many small fragments scattered throughout a carcass or gut pile. Shotgun, pistol, and muzzleloader ammunition are also available in high performing non-lead alternatives. There are also non-lead alternatives for hand-loaders.

Since 2005, as part of an effort to reduce lead exposure in condors, the Arizona Game and Fish Department has provided free non-lead ammunition to big game hunters in Units 12A, 12B, 13A, and 13B (the areas condors frequent most during the hunting season). The department also instituted a gut pile raffle program where hunters shooting lead-based ammunition in these units remove their gut piles from the field for proper disposal. Hunters responded with 80 to 90 percent voluntarily using non-lead ammo or removing their gut pile to benefit condors since 2007. Thanks to the efforts of these hunters, the amount of lead available to condors has been reduced in Arizona. According to [post-hunt survey results](#), 93 percent of hunters who used the non-lead ammunition said it performed as well as or better than lead bullets. In addition, 72 percent of all hunters said they would recommend the 100 percent copper bullets to other hunters.

The department's free non-lead ammunition program will continue as long as funding permits and is supported by the Heritage Fund (state lottery dollars), Wildlife Conservation Fund (state gaming

Videos



[Why Use Non-lead Ammunition?](#)



[California Condors in Arizona](#)

External Resources [\[More\]](#)

- [Hunting with Non-lead Ammo](#)
- [The Peregrine Fund](#)
- [U.S. Fish and Wildlife Service](#)

Lead Research

- [Peregrine Fund Library](#)
- [USFWS](#)

revenue) and the Federal Aid funds (Pittman-Robertson act).

If you cannot find non-lead ammunition in your caliber, or choose to use lead ammunition, you can still help condors and all other scavengers by removing ALL shot animals (including coyotes, small and big game) and gut piles from the field.

Several sportsmen's groups and agencies have joined the effort to help condors. A Condor Conservation Coalition was formed to promote voluntary lead reduction efforts within condor range, including the use of non-lead ammunition. If your sportsmen's group is interested in joining this coalition and continuing the proud tradition of wildlife conservation, please contact the Arizona Game and Fish Department Condor Coordinator. Current local coalition members include the **Arizona Deer Association, Arizona Antelope Foundation, Arizona Desert Bighorn Sheep Society,** and **Arizona Chapter of the National Wild Turkey Federation.**

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