The Association of Fish and Wildlife Agencies maintains this page as a free resource to members of the fish and wildlife management community who are looking for introductory scientific information describing the complex interactions between lead and fish, wildlife, and their habitats. Lead (chemical symbol Pb) is the heaviest non-radioactive element and has been used historically for a wide range of household and industrial applications.

Lead has long been a popular metal for fishing equipment and ammunition, due to its abundance, heaviness, low cost, malleability, and low melting point. However, concerns about the toxicity of lead to humans and other species have led to the phase-out of this metal from many of its former uses in broader human society. The continued use of lead in wildlife and fisheries management is an active area of discussion and debate.

The Association and its Fish and Wildlife Health Committee have established the Lead Working Group in order to facilitate dialogue and information-sharing among interested parties. The references provided here represent a diversity of scientific perspectives regarding the use of lead in fish and wildlife management in the United States. We appreciate the input from members of the Lead Working Group, The Wildlife Society, and the American Fisheries Society in the development of this page.

**Overview Documents and Websites**


U. S. Geological Survey, National Wildlife Health Center
Known and Potential Impacts of Lead on Wildlife

U.S. National Park Service, Pinnacles National Park, California
Lead and Wildlife


**Biological and Ecological Studies**

**Overview**


**Lead Isotope Studies: An Introduction**


**California Condors**


See also the section on **Scientific Discussion and Debate** below for several widely-cited publications on condors.

**Waterfowl**


**Large Mammals**

**Raptors/Scavengers**


**Doves/Ground-feeding birds**


**Impacts on Effectiveness and Harvest Efficiency**


Human Dimensions – Hunter/Angler Attitudes and Understanding


Shooting Ranges


Scientific Society Position Statements
American Fisheries Society
The Wildlife Society

Scientific Discussion and Debate
One of the key features of the scientific process is open debate and critical review of findings. Here are two widely-circulated papers on California condors, as well as two responses which critique these papers.


Saba, D. 2008. Comment on "Ammunition is the Principal Source of Lead Accumulated by California Condors Re-Introduces to the Wild." Environmental Science and Technology. 42: 1807-1808.