AFS Policy Statement on Lead in Sport Fishing Tackle
Adopted October 2012

Issue Definition
Lead is a toxic element that occurs naturally in the environment. In biological systems it has neither a functional nor beneficial role and can be toxic at very low levels of exposure (see, e.g. Pfeiffer, 1999). To limit exposure, and prevent the resulting detrimental effects on animal and human health, lead is now banned in gasoline, paint, and solder in many countries.

The use of lead in fishing tackle dates back thousands of years, because it is readily available, dense, malleable, and inexpensive. Several investigations have estimated substantial losses of lead fishing tackle in lakes and rivers (Schroeder, 2010; Eisler,1988). While lost fishing tackle remains relatively stable and intact for decades or centuries in the aquatic ecosystem, lead can become more biologically available under certain environmental conditions (e.g., soft acidic water, mechanical agitation). Whether or not the lead dissolves within the aquatic ecosystem does not alter its toxicity to biological organisms, as lead bioaccumulates through the foodweb (Javid et al., 2007; Spehar et al., 1978; Vinodhini & Narayanan, 2008).

The hazards of ingestion of lead fishing sinkers and jigheads by waterbirds became apparent during the 1970s and 1980s with identification of lead poisoning of localized populations of swans in the United Kingdom (UK) and loons in the United States (US). Loons and swans ingest lead fishing tackle when they mistake small lead sinkers and jigheads for the small stones they pick up from the bottom of lakes and rivers to help them digest their food, or when they ingest fishing line with a lead sinker still attached to a baited hook. A single ingested lead sinker or jighead will expose a waterbird to a lethal dose of lead since digested lead is readily absorbed into animal tissue.

Restrictions on the sale or use of lead weight have been instituted in parts of the United Kingdom, Denmark, Canada, several other countries, and six states in the US (as of June 14, 2011, http://www.pca.state.mn.us/oea/reduce/sinkers.cfm) to minimize effects on waterbirds and other potentially vulnerable species. In 2010, the American Bird Conservancy and a number of other groups petitioned the US Environmental Protection Agency (EPA) under the Toxic Substances Control Act requesting a ban on the use of lead fishing tackle. The EPA denied the request for a national ban on lead fishing tackle citing increasing federal and state restrictions on the use of lead in fishing gear and prevalence of non-lead alternatives in the marketplace.

While the use of lead fishing tackle contributes a small fraction of the total amount of lead found in the environment in comparison to other sources of lead (e.g., surface runoff, atmospheric deposition, and mining activities), it exists in a form that can be readily ingested by some species of wildlife (i.e., sinkers and jigheads less than 2.5 cm or 1 inch). Significant negative effects on localized populations of loons and swans from ingestion of lead fishing tackle in areas of high angling effort have been documented. These occurrences are seen by some as an indicator of a wider problem in the aquatic environment (Schroeder, 2010; Eisler, 1988; Spehar et al., 1978).

Several governments have initiated education programs to encourage anglers to use sinkers and jigs less than 2.5 cm made from non-toxic materials. This has corresponded with a variety of substitutes for lead fishing sinkers entering the marketplace in recent years. A few (e.g., ceramics, bismuth, steel, tin, and tungsten), but not all (e.g., zinc, brass), alternative metals in fishing tackle have been deemed safe or less toxic if ingested by waterbirds and other birds and mammals. Sinkers and jigheads made from these alternative raw materials, except tungsten, are less dense resulting in a larger sized sinker to obtain a similar weight as with lead. This larger size and higher cost for most alternative metal sinkers and jigheads (e.g., tungsten-based products) makes them less desirable for some anglers.

Policy and Needed Actions

The policy of the American Fisheries Society, in regard to lead fishing tackle is to:

1. Recognize that lead has been known for centuries to be toxic to biological organisms. Thus, the loss and subsequent ingestion of lead sinkers and jigheads by aquatic animals and the potential ramifications of lead ingestion is a natural resource management issue.

2. Understand that the impact of ingested lead on individuals of certain waterfowl species is generally accepted, but population-level impacts on fish and wildlife species are not well-documented. Although conclusive scientific proof of these effects is not currently available, actions to inform, educate, and encourage sport fishing tackle manufacturers, users, and researchers to reduce future introductions of lead into aquatic ecosystems appears advisable. Accordingly, collaborate with fish and wildlife professionals, tackle manufacturers, anglers, policy makers and the public to encourage the use of non-lead forms of small fishing sinkers and jigheads that are protective of potentially affected fish and wildlife populations.

3. Encourage scientifically rigorous research on lead tackle aimed at generating toxicological and environmental chemistry data including bioavailability assessments; support monitoring and modeling of exposure and effects on at-risk populations; encourage studies predicting consequences of exposure and long-term population-level effects of different tackle material; and encourage studies on reducing the economic and social barriers to non-toxic fishing tackle development and use.

4. Recognize that the hunting and angling communities can be important advocates and forces of change regarding natural resources issues, and support educational efforts to promote greater public awareness and understanding of the consequences of lead exposure in wildlife species and the potential gains in environmental quality from use of lead-free fishing tackle.

5. Update policy language as focused research provides additional data on lead tackle-related impacts.

Literature Cited

Eisler, R. 1988. Lead hazards to fish, wildlife, and invertebrates: a synoptic review. U.S. Fish & Wildlife Service Biological Report 85(1.14)

Goddard, C.I., N.J. Leonard, D.L. Stang, P.J. Wingate, B.A. Rattner, J.C. Franson, and S.R. Sheffield. 2008. Management concerns about known and potential impacts of lead use in shooting and in fishing activities. Fisheries 33(5):228-236.

Javid, A., M. Javid, S. Abdullah and Z. Ali. 2007. Bioaccumulation of lead in the bodies of major carps during 96-h LC^50 exposures. Int. J. Agri. Biol. 9(6):909-912

Pfeiffer, C.B. 1999. The Complete Book of Tackle Making. Guilford, CT: The Globe Pequot Press, 553pp.

Rattner, B.A., J.C. Franson, S.R. Sheffield, C.I. Goddard, N.J. Leonard, D. Stang, and P.J. Wingate. 2008. Sources and implications of lead-based ammunition and fishing tackle to natural resources. Wildlife Society Technical Review 08-01. The Wildlife Society, Bethesda, Maryland.

Scheuhammer, A.M., S.L. Money, D.A. Kirk, and G. Donaldson. 2003. Lead fishing sinkers and jigs in Canada: review of their use patterns and toxic impacts on wildlife. Canadian Wildlife Service Occasional Paper 108, Environment Canada, Ottawa, Ontario.

Schroeder, R.R. 2010. Lead fishing tackle: the case for regulation in Washington State. MSc Thesis, Evergreen State College

Spehar, R.L., R.L. Anderson, and J.T. Fiandt. 1978. Toxicity and bioaccumulation of cadmium and lead in aquatic invertebrates. Environ. Pollution 15:195-208

Vinodhini, R. and M. Narayanan. 2008. Bioaccumulation of heavy metals in organs of fresh water fish Cyprinus carpio (common carp). Int. J. Environ. Sci. Tech. 5(2):179

Additional References

Center for Biological Diversity, American Bird Conservancy, Association of Avian Veterinarians, Project Gutpile, and Public Employees for Environmental Responsibility. 2010. Petition to the Environmental Protection Agency to ban lead shot, bullets, and fishing sinkers under the Toxic Substances Control Act.

Duerr, A.E. 1999. Abundance of lost and discarded fishing tackle and implications for waterbird populations in the United States. Master's thesis. University of Arizona, School of Renewable Natural Resources, Tucson, Arizona.

Duerr, A.E. and S. DeStefano. 1999. Using a metal detector to determine lead sinker abundance in waterbird habitat. Wildlife Society Bulletin 27:952-958.

Franson, J.C., S.P. Hansen, T.E. Creekmore, C.J. Brand, D.C. Evers, A.E. Duerr, and S. DeStefano. 2003. Lead fishing weights and other fishing tackle in selected waterbirds. Waterbirds 26:345-352.

Jacks, Gunnar, M. Bystron, and L. Johansson. 2001. Lead emissions from lost fishing sinkers. Boreal Environment Research 6:231-236.

Michael, P. 2006. Fish and wildlife issues related to the use of lead fishing gear. Washington Department of Fish and Wildlife, Fish Program, FPT 06-13.

Pokras, M.A., M.R. Kneeland, A. Major, R. Miconi, and R.H. Poppenga. 2009. Lead objects ingested by Common Loons in New England. Extended abstract *in* R. T. Watson, M. Fuller, M. Pokras, and W. G. Hunt (Eds.). Ingestion of Lead from Spent Ammunition: Implications for Wildlife and Humans. The Peregrine Fund, Boise, Idaho, USA.

Radomski, P., T. Heinrich, T.S. Jones, P. Rivers, and P. Talmage. 2006. Estimates of tackle loss for five Minnesota walleye fisheries. North American Journal of Fisheries Management 26:206-212.

Scheuhammer, A.M. 2009. Historical perspective on the hazards of environmental lead from ammunition and fishing weights in Canada. *In* R. T. Watson, M. Fuller, M. Pokras, and W. G. Hunt (Eds.). Ingestion of Lead from Spent Ammunition: Implications for Wildlife and Humans. The Peregrine Fund, Boise, Idaho, USA.

Sidor, I.F., M.A. Pokras, A.R. Major, R.H. Poppenga, K.M. Taylor, and R.M. Miconi. 2003. Mortality of Common Loons in New England, 1987 to 2000. Journal of Wildlife Diseases 39:306-315.

Strom, S.M., J.A. Langenberg, N.K. Businga, and J.K. Batten. 2009. Lead exposure in Wisconsin birds. *In* R. T. Watson, M. Fuller, M. Pokras, and W. G. Hunt (Eds.). Ingestion of Lead from Spent Ammunition: Implications for Wildlife and Humans. The Peregrine Fund, Boise, Idaho, USA.

Watson, R.T. and D. Avery. 2009. Hunters and anglers at risk of lead exposure in the United States. *In* R. T. Watson, M. Fuller, M. Pokras, and W. G. Hunt (Eds.). Ingestion of Lead from Spent Ammunition: Implications for Wildlife and Humans. The Peregrine Fund, Boise, Idaho, USA.