

REGULATION OF LEAD-BASED AMMUNITION AROUND THE WORLD

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ABSTRACT.—The use of lead shot and bullets has been regulated in many countries around the world. Using published literature, we compiled a summary of the extent, type, reason, and date for establishing ammunition legislation in each country where it exists. We documented 29 countries with regulations on lead ammunition. The types of bans varied widely and ranged from partial, voluntary restrictions of the use of lead shot to a total ban on the use and import of lead ammunition. The most common restriction (n=14) was the ban of lead shot for hunting of waterfowl over wetlands. The reason for the ban of lead ammunition was most often due to concerns over populations of waterfowl or avian scavengers. Many countries created legislation in response to the African-Eurasian Waterfowl Agreement's (AEWA) recommendation for the use of nontoxic shot over wetlands. Other countries, such as Liberia, banned the use of lead ammunition after a military coup. A timeline demonstrates the momentum with which this issue is gaining ground with most of the regulations taking place in the past 15 years and further regulations under discussion in many areas. An accumulating body of evidence shows that a reduction in the use of lead for hunting also benefits wildlife and humans who consume wild game. *Received 16 May 2008, accepted 25 July 2008.*

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THE USE OF LEAD SHOT AND BULLETS is regulated in many countries around the world. The types of regulation vary widely and range from partial, voluntary restrictions of the use of lead shot to a total ban on the use and import of lead ammunition. Most countries have implemented regulations due to concerns about the health of migratory waterfowl and avian scavengers. Existing regulations are being strengthened and new ones implemented due to accumulating evidence of the adverse health effects in wildlife and humans of lead from spent ammunition.

METHODS

We used the internet to search for reports and peer-reviewed articles on lead ammunition regulation.

We compiled a summary of the extent, type, reason, and date for establishing lead-based ammunition legislation in each country where it exists. Data that could not be verified for accuracy were excluded.

RESULTS

Our search yielded 29 countries that have implemented voluntary or legislative restrictions on the use of lead ammunition (Table 1). Two countries have banned all forms of lead ammunition. Six countries have a partial ban on the use of lead bullets in addition to full bans on lead shot. Four countries have banned the use of lead shot for all hunting. Fourteen countries and Australian territories have banned the use of lead shot in wetlands or for waterfowl hunting. Two countries have voluntary

or recommended restrictions in place. Eleven countries and Australian territories have a partial ban on lead shot. Twenty-five states of the United States have implemented regulations on the use of lead shot in addition to the Federal guidelines. Seven countries have implemented increasingly strict regulations on lead ammunition over time.

DISCUSSION

Many countries created legislation in response to the African-Eurasian Waterfowl Agreement's (AEWA) recommendation for the use of nontoxic shot over wetlands (Beintema 2001). Concern about populations of avian scavengers have prompted bans in several countries, such as Japan, and in the United States lead ammunition has been banned in portions of California used by condors. Liberia, where lead shot was banned due to a military coup, was the only country to ban lead ammunition for reasons other than health of wildlife or humans.

Increasingly strict regulation imposed on the use of lead ammunition is a growing trend internationally. A timeline (Table 2) demonstrates the momentum with which this issue is gaining ground with most of the regulations taking place in the past 15 years and further regulations under discussion in many areas. Scandinavian countries have led the way in a full ban on lead ammunition, with Denmark ban-

ning lead in 2000 and Sweden scheduled to implement a full ban in 2008.

Evidence of lead exposure in Arctic subsistence hunters who continue to use lead shot (Dewailly et al. 2001, Johansen et al. 2003) suggests that the ban on behalf of eagles has benefited humans as well. Countries worldwide are responding to an accumulating body of evidence that shows that the reduction in the use of lead-based ammunition for hunting benefits wildlife and humans who consume wild game.

LITERATURE CITED

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- LEAD AMMUNITION REGULATION -

Table 1. Comparison of types of lead-based ammunition regulation worldwide in 2008. Asterisk indicates states or other sub-regions of countries.

Country or State	Recommended use of nontoxic shot	Partial ban on lead shot	Ban on lead shot in wetlands or for waterfowl	Ban on lead shot for all hunting	Partial ban on lead ammunition	Ban on all forms of lead ammunition	Ban on hunting	Nontoxic shot regulations in addition to Federal
Austria	Banned prior to 2002							
Australia								
*Capital Territory, AU							Hunting ban on native wildlife	
*Western Australia, AU							Hunting ban on duck and quail	
*South Australia, AU		Banned during duck season, 1998		1993				
*Northern Territory, AU		Banned in hunting reserves, 1998						
*Queensland, AU	2001	Banned at three sites					Hunting ban on duck and quail, 2005	
*Tasmania, AU			2004					
*New South Wales, AU		Ban for duck hunting					Hunting ban on duck	
*Victoria, AU		Banned for duck hunting, 1993	1995					
Denmark	1985		1993	1996		Ban on the import of lead ammunition, 2000		
Belgium		Banned in Ramsar sites, 1993	1998	Ban considered for 2008				
Canada			1997	1999 lead shot banned for hunting game birds				

- AVERY AND WATSON -

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Cyprus			1993					
Finland			1996					
France			2006					
Germany	1993	Ban in 10 states						
Ghana							Hunting ban in wetlands and irrigation sites	
Hungary			2005					
India							All hunting banned	
Israel							Most wetlands closed to hunting—must use lead shot	
Italy			Proposed date unknown					
Japan					Partial ban on lead ammunition for deer, 2000			
Kenya								
Latvia		Banned in wetland SPA's, 2000						
Liberia			Military coup banned lead shot, 1980					
Malaysia		Date unknown						
Malta		Banned in two wetlands						

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Mauritania						Ban on all lead for large game and sport hunting 1975		
Netherlands				1993	Banned for clay pigeon shooting, 2004			
Norway			1991	2005				
Poland	Recommended							
Portugal			Proposed for 2008					
Russia		Some restrictions for wetlands						
South Africa		Partial ban on lead shot for waterfowl						
Spain		Banned in Ramsar sites in 1994	2001					
Sweden			2002		Banned for clay pigeon shooting, 2002	2008		
Switzerland			1998					
Great Britain								
*England		Voluntary ban in 1995	1999					
*Scotland			2005					
*Wales		Banned in SSSI wetlands 2002						
New Zealand		10 or 12 gauge shot banned, 2006						
United States			1991					
*Tejon Ranch, CA						2008		
*Camp Roberts, CA						2007		
*Alabama								

- AVERY AND WATSON -

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*Alaska								Yes
*Arizona								
*Arkansas								
*California					Banned in Condor range 2008			Yes
*Colorado								
*Connecticut								
*Delaware								
*Florida								
*Georgia								
*Hawaii								
*Idaho								
*Illinois								Yes
*Indiana								
*Iowa								Yes
*Kansas								Yes
*Kentucky								Yes
*Louisiana								Yes
*Maine								Yes
*Maryland								Yes
*Massachusetts								Yes
*Michigan								Yes
*Minnesota								Yes
*Mississippi								
*Missouri								Yes
*Montana								
*Nebraska								Yes
*Nevada								
*New Hampshire								

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*New Jersey								Yes
*New Mexico								Yes
*New York								Yes
*North Carolina								Yes
*North Dakota								Yes
*Ohio								Yes
*Oklahoma								
*Oregon								Yes
*Pennsylvania								
*Rhode Island								
*South Carolina								
*South Dakota								Yes
*Tennessee								
*Texas								
*Utah								Yes
*Vermont								
*Virginia								
*Washington								Yes
*Wyoming								Yes

Table 2. Regulation of lead ammunition over time.

Date	Country and type of regulation
1975	Mauritania hunting laws prohibit use of toxic ammunition for large game and sport hunting.
1980	Liberia bans lead shot due to military coup.
1985	Denmark hunters initiate use of nontoxic shot.
1989	
1990	
1991	USA bans the use of lead shot over wetlands. Norway bans lead shot in wetlands for hunting of all ducks, geese, and waders.
1992	
1993	South Australia, Australia bans the use of lead shot. Victoria, Australia bans the use of lead shot during duck season. Denmark bans the use of lead shot over wetlands. Cyprus bans the use of lead shot over wetlands. Germany bans the use of lead shot over wetlands in 8 Lander and recommends voluntary use of nontoxic shot over all wetlands. Belgium bans the use of lead shot over Ramsar wetlands. February-Netherlands bans the use of lead shot for hunting over wetlands.
1994	
1995	Victoria, Australia bans the use of lead shot for duck hunting. Netherlands bans the use of lead shot in all hunting. UK instills voluntary use of nontoxic shot over wetlands.
1996	Denmark bans the use of lead shot in all hunting. Finland bans the use of lead shot over wetlands.
1997	Canada bans the use of lead shot for hunting migratory game birds near water.
1998	Switzerland bans the use of lead shot for hunting over wetlands and shallow water areas. Belgium bans the use of lead shot over all wetlands. Northern Territory, Australia bans the use of lead shot during duck season.
1999	England prohibits use of lead shot over wetlands and for all waterfowl. Canada bans the use of lead shot for hunting all migratory game birds (with a few exceptions).
2000	Japan bans the use of lead bullets for deer hunting in Hokkaido. Latvia bans the use of lead shot over wetland special protected areas. Spain bans the use of lead shot at Ramsar sites. Denmark bans the import of all lead products including ammunition.
2001	Queensland, Australia instills voluntary ban on the use of lead shot over wetlands. 1 June-Spain bans the use of lead shot over all wetlands.
2002	Sweden bans the use of lead shot over wetlands. Wales bans the use of lead shot over wetland sites of special scientific interest. Sweden bans the use of lead shot for clay pigeons.
2003	
2004	Netherlands bans the use of lead shot for clay pigeons. Tasmania, Australia bans the use of lead shot over public wetlands and Crown Land.
2005	Hungary bans the use of lead shot over wetlands. 31 March-Scotland bans the use of lead shot over wetlands. Norway bans the use of lead shot for all hunting.
2006	New Zealand bans 10 and 12 gauge shot for waterfowl near water. France bans the use of lead shot over wetlands.
2007	Camp Roberts, California, USA bans all lead ammunition for hunting. Fort Hunter Liggett, California, USA bans lead ammunition for hunting.
2008	Tejon Ranch, California, USA bans all lead ammunition for hunting. Camp Roberts, California, USA bans use of all lead shot and ammunition for hunting. California, USA bans the use of lead ammunition when taking big game and coyotes in the California Condor range in California. Sweden enacts a total ban on lead shot and ammunition. Belgium considers a total ban on the use of lead shot. Portugal proposes a ban on the use of lead shot in wetlands.