Alternatives to lead hunting shot pose their own hazards

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Hunting with lead shot is highly restricted or entirely banned in many countries due to the danger of poisoning birds and environment. However, alternative ammunition is not without its own risks, as was discovered in a study conducted by a team of researchers from the Technical University of Munich.

Due to its ballistic properties, lead shot has been regarded as the optimal ammunition for hunting waterfowl. But it causes lead poisoning in ducks and sea eagles that ingested the shot during bottom feeding, respectively with their prey.

Ammunition manufacturers now offer a range of alternative hunting shot containing iron, copper, zinc, tungsten or bismuth as the primary declared component. A team of researchers at the TU Munich led by Prof. Dr. Axel Goettlein and Prof. Dr. Jürgen Geist, however, has come to the conclusion that a number of the alternatives are even more toxic to water organisms than conventional lead shot.

As part of the study, shot made of each of the materials was exposed to identical conditions in water. These measurements demonstrated that the quantity of metal ions released into the solution varies greatly. While shot made of tungsten, bismuth and a coated lead shot released almost no metal ions into the solution, alarmingly high concentrations were measured for shot made of copper and zinc. The researchers found that it was not always the declared main component of the shot that dominated ion release. Particularly striking was a sample of iron shot

that released large quantities of zinc, which obviously came from a coating.

Rethinking Bans

In an immobilization test for the water flea Daphnia magna, their movement behaviour is used as an indicator of vitality. As the study showed, even small quantities of copper and zinc consistently led to very high or complete immobilization of this model organism. In contrast, shot made of pure iron, bismuth, and tungsten did not impact the mobility of the water fleas. Nor did lead shot cause a significant impact on the mobility of the water fleas as compared to the control group.

The current findings indicate that a prohibition on copper and zinc for manufacturing of shot should be enacted. Because widely different conditions concerning water quality in conjunction with the correspondingly adapted organisms occur in nature, additional studies are necessary in order to provide a sound basis for making decisions concerning alternatives to lead shot.

More information: Julian Fäth et al, Leaching behavior and ecotoxicological effects of different game shot materials in freshwater, *Knowledge & Management of Aquatic Ecosystems* (2018). DOI: 10.1051/kmae/2018009

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