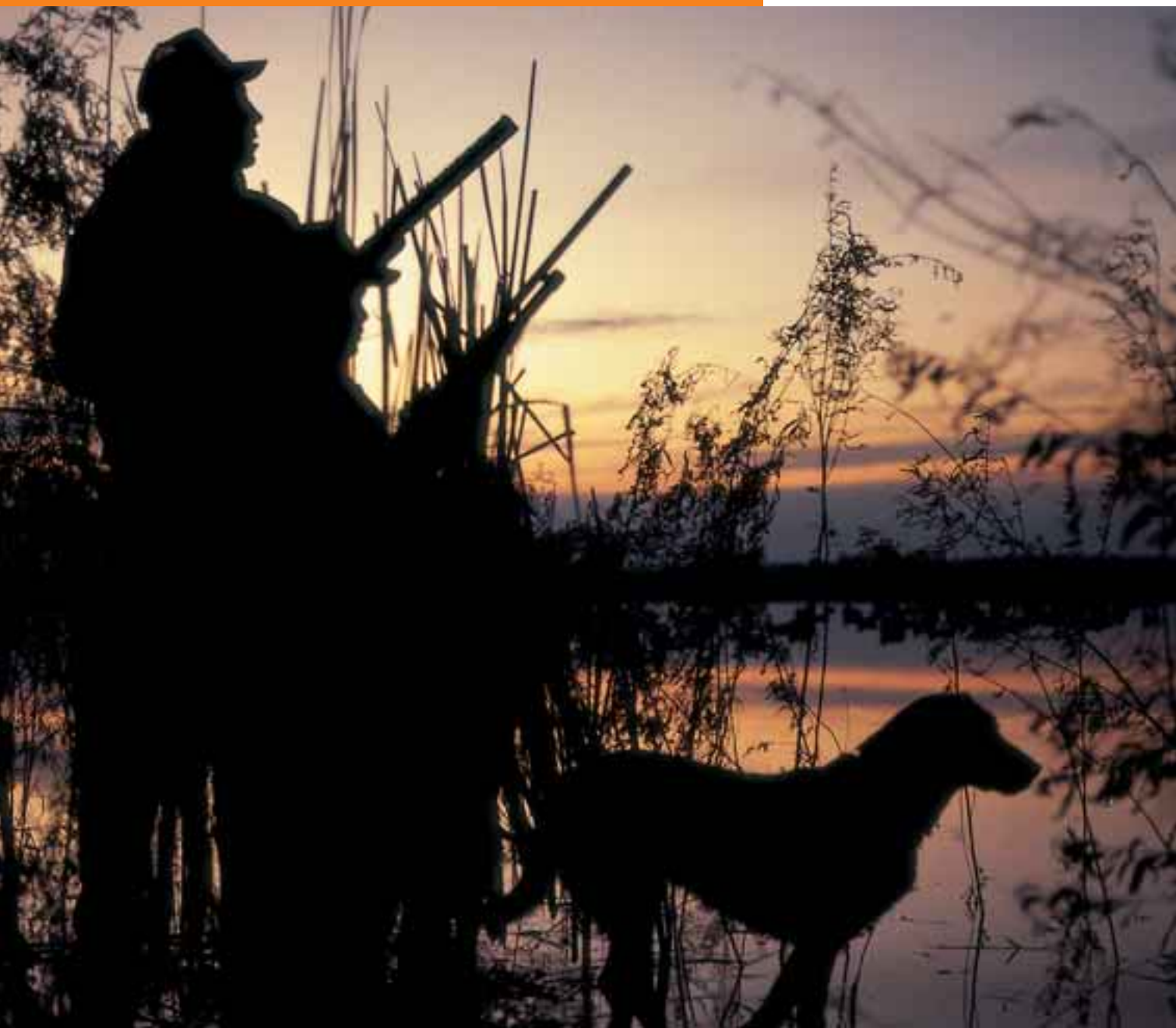
THE AFRICAN-EURASIAN WATERBIRD AGREEMENT, AN AGREEMENT UNDER THE BONN CONVENTION, AIMS TO CREATE A LEGAL BASIS FOR A CONCERTED CONSERVATION AND MANAGEMENT POLICY BY THE RANGE STATES FOR MIGRATORY WATERBIRD SPECIES

SPECIAL ISSUE # 1 SEPTEMBER 2002

AFRICAN-EURASIAN MIGRATORY (WATER BIRD) AGREEMENT

SPECIAL EDITION: LEAD POISONING IN WATERBIRDS THROUGH THE INGESTION OF SPENT LEAD SHOT

NEWSLETTER



EDITORIAL

The AEWA Newsletter is an important tool in informing readers of ongoing developments and activities in the Agreement area. The Secretariat aims to publish these Newsletters on a regular basis. Recently, the Secretariat decided to produce a series of special editions of the Newsletter, dedicated to subjects that deserve special attention.

This is the first issue in the series of special editions of the AEWA Newsletter. It aims to summarise the issue of lead poisoning in waterbirds through the ingestion of spent lead shot, and to evaluate possible difficulties that arise when addressing the issue. Most importantly, it aims to provide policy-makers and hunters' organisations with practical solutions and ideas through the experiences of people around the world who are involved in and concerned about the issue of lead poisoning in waterbirds.

This newsletter was composed by Nienke Beintema on behalf of the AEWA Secretariat. Information was received from a great number of people, for which the Secretariat is extremely grateful. The Secretariat encourages further distribution of this Newsletter; additional copies can be ordered free of charge.

The visions presented in the textboxes of this Newsletter are personal opinions, and therefore do not necessarily represent the view of the AEWA Secretariat.

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LEAD POISONING IN WATERBIRDS:
NOT A NEW ISSUE

In 1894, the American naturalist George B. Grinell wrote a remarkable article in the ecological magazine *Forest and Stream*. He stated that waterbirds can suffer from serious lead poisoning after the ingestion of spent lead shot. Scientists, governments and hunters' organisations hardly took this observation seriously, until almost a century later, when a significant number of deaths among waterbirds became apparent in North America and Europe.

During the 1980s and 1990s, the issue was gradually recognised as a serious environmental problem that needed to be addressed as soon as possible. The International Association of Fish and Wildlife Agencies (IAFWA) started this process by initiating a series of educational programmes for hunters, which emphasised the need for the use of alternative ammunition. Political action soon followed. In 1991, the United States were the first nation to ban the use of lead shot for waterbird hunting. International co-ordination of similar actions started in that same year when the International Waterfowl and Wetlands Research Bureau (IWRB, now Wetlands International) convened a workshop to assess the scale of the issue,
and to discuss possible solutions.

The outcomes of this workshop led to the formulation of regulatory statements in a number of international Conventions and Agreements, notably AEWA. Paragraph 4.1.4 of AEWA's Action Plan states that *Parties shall endeavour to phase out the use of lead shot for hunting in wetlands by the year 2000*. During the past few years, however, it became clear that there are many aspects that impede a rapid switch to non-toxic alternatives. Only six AEWA Range States – Canada, Norway, Finland, Denmark, The Netherlands and Switzerland – plus the USA have actually banned the use of lead shot in wetlands. Unfortunately many countries made little progress or have not yet started the process.

AN INTRODUCTION

DR. BAZ HUGHES, HEAD OF THREATENED SPECIES AT THE WILDFOWL &WETLANDS TRUST, AND CHAIR OF THE SPECIES SURVIVAL COMMISSION OF IUCN/WETLANDS INTERNATIONAL:

"Lead is an extremely toxic substance. All of the physiological effects of lead are adverse. Increasing awareness of the danger of lead poisoning in humans and animals has resulted in a substantial reduction in its use in paint, water piping, pencils, solder on cans, fishing weights and in petrol. However, lead is still in use by wildfowlers and other hunters as shotgun ammunition. More than fifty years of research in over twenty countries have shown that the ingestion of lead pellets by wildfowl leads to significant mortality from lead poisoning. Millions of waterbirds are estimated to die of lead poisoning each year. Eating just one lead pellet can kill a bird. As lead shot remains in the environment for many tens of years, novel solutions for lead shot removal from wetlands provide a positive and exciting area for future research.

Over the last ten years, there have been significant moves to reduce lead shot deposition worldwide. Often new legislation to ban or restrict the use of lead shot has been introduced. However, few countries have subsequently introduced monitoring schemes to assess the effectiveness of these legislative measures. For example, a recent study in the United Kingdom demonstrated that lead shot was still being used to shoot waterfowl, some three years after a ban on lead shot was introduced.

Reduction of the levels of lead poisoning in waterfowl requires an integrated approach of direct conservation measures and education/awareness-raising. International hunting organisations, such as the Federation of Associations for Hunting and Conservation (FACE) and Conseil International de la Chasse (CIC), are playing a crucial role in this process. FACE, for example, helped organise an international meeting on non-toxic shot which was held in Romania in October 2001."

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CONSERVATION-ORIENTED HUNTER

NIELS KANSTRUP, DIRECTOR OF THE DANISH HUNTERS' ASSOCIATION, KALØ, DENMARK:

AN ISSUE OF INTERNATIONAL IMPORTANCE

"The lead poisoning issue has many international aspects. Firstly, many of the species that are affected are migratory waterbirds that cross several borders during migration. The impact of management – for example regarding lead shot – in one country might affect the flyway situation and so be of importance to all range states. Secondly, the question of lead shot is also a question of the image of the hunters. The public opinion in one country will have an impact in other countries, so both the hunters' and the national administration will benefit from international co-ordination and exchange of knowledge. Finally, making alternatives available is a focal point in phasing out lead shot. This is an international affair: research and development of alternatives and analysis of the market for sale of alternatives is facilitated by international co-operation.

There are several reasons why addressing the issue of lead shot is so difficult. The problem of lead poisoning of wildlife is not very apparent. Many hunters will claim correctly that "they never found a poisoned bird". The number of deaths among waterbirds due to lead poisoning is still regarded by many hunters and their organisations as being on a very small-scale or negligible. At the same time, many hunters are very sceptical about using an alternative, not because hunters necessarily have any factual experience, but because "they always used lead". In other words, hunters are conservative, and often this is combined with a widespread and well-organised propaganda against alternatives which is often based on commercial interests.

LEARNING BY DOING

In many countries the authorities have introduced a phase-out of lead shot. The resistance is often seen to come from the industry and organisations representing hunters and clay pigeon shooters. In Denmark the first real progress was seen when hunters tried to use alternatives (steel was the only option at that time) themselves, when the first regulation came into force in 1985. Studies carried out by the hunters' association showed that the lethality of steel shot was comparable to that of lead. Introduction of steel shot for clay pigeon shooting made many hunters realize that steel cartridges were not at all dangerous to fire, and the price of cartridges was still acceptable. Practical use of alternatives showed people that all the rumours about exploding guns, crippled game, high prices etc. were really only rumours. Therefore, in my opinion the key solution is 'learning by doing', and any central approach needed for pushing things in the right direction should respect the users and their observations.

Denmark is not typical as we chose a total ban on the use of lead shot including all hunting and all clay pigeon shooting, the latter still with a few exceptions. Banning lead shot for shooting in forests caused a new problem, as steel is not accepted by foresters due to its hardness and risk of damage to machinery used in the timber industry. This situation put pressure on the development of soft alternatives: bismuth, tungsten products, tin etc. These have shown to be quite popular although the price of these cartridges is significantly higher than the price of lead and steel.

THE DANISH EXPERIENCE

Many Danish hunters feared (and some anti-hunt people hoped!) that the phasing out of lead shot would mean the phasing out of hunting altogether. Seventeen years of experience have shown that this never became a reality. Neither the number of hunters nor the annual bag changed significantly. The first main worry was the risk of guns exploding or being damaged by steel shot. This, however, was shown to be unfounded. Also, the lethality of alternative shot has been investigated in several scientific and more popular programmes, the result showed that lethality is connected to hunters' behaviour (shooting distances) more than to the performance of the cartridge.

Lead is still regarded as an ideal material due to its ballistic qualities, but there have been many examples of lead shot cartridges being much poorer than cartridges with alternative shot materials. In other words: efficiency of a type of shot is a question of cartridge quality more than shot material. The phasing out of lead has put a focus on lethality. Steel shot has to some degree taught hunters to be more cautious by shortening the shooting distances. This has caused an increase in the total efficiency of the shot, as shortening of distances will markedly increase the hitting probability. In Denmark, during the past five years, there has been a focus on crippling rates, but without an actual connection to the phasing out of lead shot.

"HONESTLY, I DON'T REALLY MIND WHAT SHOT I USE. I AM NOT AT ALL CONCERNED ABOUT ANY DAMAGE BEING DONE TO MY GUN OR A RISK OF EXPLOSION." NIELS KANSTRUP

From the moment hunters became acquainted with steel shot, both for hunting and clay pigeon shooting, the process gained the right momentum. Before then, many were very sceptical and the question caused many fights, both within the hunters' community and outside of it. Therefore the use of steel shot has been a success although there is some evidence that lead is still used illegally to a certain degree. Today, hunters are not complaining (at least not about this particular problem!), although many still do not see the logic behind the total ban of lead, also enforced in upland hunting.

DUAL ROLE AS HUNTER AND CONSERVATIONIST

Honestly, I do not really care what shot I use. To shoot geese, heavy sea ducks, foxes etc., I always choose high performance shot – mostly steel shot size 3,5 mm to 4 mm. For smaller game species I will use any alternative with a standard load (28 gram). In general, I am more aware of shooting distances than before, and today I keep monitoring the number of shot used per bagged animal, which should always be somewhat below 3. I am not at all concerned about any damage being done to my gun or a risk of explosion. Concerning security I am aware of the higher risk of ricocheting from hard shot (mostly steel), although this has caused no increase in the numbers of hunting accidents in Denmark. In areas where you might hit hard surfaces (ground, stones, trees) I would normally use soft shot.

Having observed the phasing out of lead shot in Denmark during the last fifteen years, I have listened to and taken part in a lot of discussions. My role has been a dual one as the authorities regard me (correctly) as a hunters' representative and the hunters often regard me as a useless conservationist. The authorities have been quite firm, but they have also been willing to listen to the hunters and their organisations. The total ban on the use of lead shot has been implemented in several steps, giving room for development and giving the hunters a chance to adapt to the new situation. On the other hand, hunters have also been open and willing to take up the challenge, mostly because they want to present a good image of hunters being responsible partners in modern nature management. Looking back, the process has definitely been an example of a 'win-win' situation.

A PIECE OF ADVICE...

My advice for hunters who are reluctant to switch, would be: Try the alternatives yourself! As for governments: Take the hunters seriously. They are the main stakeholders. Keep a firm line, but leave some of the responsibility to hunters. Look at the experiences in other countries, but accept the need of local hunters to take part in the awareness–building process.

The Danish example of banning all use of lead for hunting seems to be too ambitious for most other countries. To many of them, hunting-related lead poisoning is a rather limited problem compared to general conservation needs. Hopefully, the first priority will be to safeguard the existence of ecosystems such as wetlands, in this case by addressing general problems regarding wetlands and waterbird management. In certain countries this is a challenge per se. In countries having the surplus to do more, there should be a focus on reducing all pollution, including lead deposition. To address the problem worldwide there is a clear need of a constructive dialogue on a national and international level between governments, nature conservationists and hunters. Such co-operation is a precondition to maintain the momentum of the process of phasing out lead shot in wetlands."

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LEAD POISONING: THE BACKGROUND

Shotgun cartridges used for hunting ducks and geese each contain about 280 pellets, weighing about 30-35 grams in all. A hunter fires an average of three to six cartridges for every bird that is hit. Only a few of the pellets actually hit the bird. The rest fall to the ground or into the water. Thus, thousands of tonnes of lead are deposited in the environment each year. In Canada, for example, where the scale of this problem was researched in detail, the lead deposition was estimated to be 2000 tonnes per year before lead shot was banned in 1991. Pellet densities in heavily hunted lakes and marshes were recorded to be as high as 200 pellets per square meter. It is estimated that these numbers are no less high in other countries worldwide. In France, for example, the annual deposition is estimated to be as high as 6250 tonnes per year, and in Spain it is around 5000 tonnes per year. As a rule of thumb, the annual lead deposition per hunter is somewhere between two and five kilograms[1].

It takes tens to hundreds of years before lead pellets dissolve into the water. Also, wetland bottoms are often too compact for pellets to sink into the sediment. Therefore, the vast majority of spent lead shot remains accessible to waterbirds for a considerable amount of time.

Waterbirds deliberately pick these pellets up from the bottom and swallow them, mistaking them for food items or grit, which is retained in the muscular waterbird stomach (gizzard) to facilitate the grinding of the food. The grinding action of the gizzard, combined with the acidic stomach fluids, causes the pellets to dissolve easily. Ionic lead is then released and enters the blood stream through the wall of the intestine.

Lead is a highly poisonous metal. Impeding the production of haemoglobin, the blood protein responsible for oxygen transportation, it causes severe anaemia. In addition, it affects the nervous and circulatory systems, liver and kidneys. Birds that ingest ten or more lead pellets will die of acute lead poisoning within a few days. If a smaller number (two to ten) is ingested, the ordeal will take much longer. Birds will gradually start to show signs of chronic lead poisoning, such as drooping wings, green and watery faeces, weight loss and atypical behaviour. This influences their ability to forage and to escape from predators. Victims of chronic lead poisoning usually die within two to three weeks. If a bird swallows only one pellet, it usually survives, although its immune system and fertility are likely to be affected. Also, even low concentrations of lead have a negative impact on energy storage, which affects the ability to prepare for migration.

1 Reference: www.univers-nature.com and personal communications.

TOXICOLOGIST

PEDRO ZOUN, PROJECT LEADER WILDLIFE RESEARCH, CENTRAL INSTITUTE FOR ANIMAL DISEASE CONTROL (CIDC), LELYSTAD, THE NETHERLANDS:

"Since 1975, we have been doing a lot of research on the incidence of lead pellet ingestion by waterbirds in The Netherlands. It was the Dutch Ministry of Agriculture, Nature Management and Fisheries that requested and financed this project. Most of the research was done in the 1980s, and our data contributed to the formulation in 1991 of a total ban on the use of lead shot for hunting waterbirds.

Also, in a more general research, over many years, we analysed the bodies of waterbirds that were found dead in the field. The majority of those had lead pellets in their stomachs; we discovered this when the birds were x-rayed. Sometimes their stomachs even contained more than twenty pellets. Those were usually largely eroded. In those instances the birds were always in a very bad condition. Diagnosis of lead intoxication was based on the lead concentrations in liver, kidney and bone tissue.

The hunting community actually contributed to our research by bringing in dead birds for us to examine. I suppose they realised that waterbird conservation would only be in their own advantage in the long run. I can understand that many of them were opposed to the ban, though. It does take a switch of mentality. Even now, after ten years of legislation, when we examine pellets that we find in birds they sometimes appear to be lead pellets. This is deplorable. Considering the serious threat of lead to the environment, it is obviously a significant improvement that it is being replaced by other materials."

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THE SCALE

Lead poisoning through the ingestion of spent lead shot is estimated to kill many millions of waterbirds worldwide each year. Already in the 1950s, scientists in North America estimated the yearly number of victims in their continent alone, to be 1.5 to 4 million. Recent research in Europe and North America showed that as many as 40% of all waterbirds ingest at least one lead pellet during a single season of exposure.

In addition, secondary lead poisoning can occur when predators or scavengers consume affected waterbirds. Research conducted in various countries (e.g. the USA, Germany, Austria, France, the United Kingdom) during the past five to ten years, showed that secondary poisoning, particularly of Bald Eagles (*Haliaeetus leucocephalus*) and White-tailed Eagles (*Haliaeetus albicilla*), is a significant source of mortality. In North America, for example, it is responsible for 10-15% of post-fledging mortality in Bald Eagles.

RISK TO HUMANS

Lead poisoning in waterbirds can also form a considerable health risk to humans. Consumption of waterbirds carrying shot in their flesh is not particularly dangerous; humans do not have a muscular stomach, so ingested lead shot usually passes through the human digestive system without considerable dissolution. However, some cases have been reported where people retained lead shot in their bodies, most often in the appendix. Lead intoxication can occur if this concerns a large amount of pellets (hospital patients in one Newfoundland study were reported to have accumulated from one to over 200 lead pellets in their appendices!).

However, as noted earlier, a large percentage of all waterbirds ingest one or more lead pellets, and consequently have elevated levels of lead throughout their bodies. Consumption of these waterbirds results inlead exposure. On average, 15% of all waterbirds have levels of lead well above the generally accepted health norm for human consumption.

"EVERY SINGLE LEAD POISONED WHITE-TAILED EAGLE IS ONE STEP BACKWARDS IN THE RECOLONISATION PROCESS."

NORBERT KENNTNER

RAPTOR SPECIALIST

NORBERT KENNTNER, ECOTOXICOLOGIST AT THE RESEARCH INSTITUTE OF WILDLIFE ECOLOGY, VETERINARY UNIVERSITY VIENNA, AUSTRIA:

"Lead poisoning in raptors will occur wherever lead shot is used for hunting. I analysed about 170-180 white-tailed eagles from Germany where the percentage of lead poisoning remains fairly stable at around 25%. I also analysed white-tailed eagles from Finland, Austria and Greenland. Secondary lead poisoning occurs in all of these countries. It is the very nature of white-tailed eagles, searching for carcasses and easy prey like shot-crippled or poisoned waterfowl, that makes this species vulnerable to lead poisoning.

I know from my own analyses of about 650 other raptors, like northern goshawks, peregrine falcons, common buzzards and marsh harriers, that all species of birds of prey, whether they hunt or scavenge, are at high risk of lead poisoning. Lead poisoning in most raptor species is even strongly underestimated, because smaller species that fall victim to lead poisoning are often quickly removed from the field by other scavengers, such as wild boars.

The main problem is that hunters are not aware of the problem of lead poisoning. I believe that it is necessary that the hunting community is thoroughly informed about the association between lead ammunition and lead poisoning in waterfowl and raptors. And even if they are aware of the problem, most hunters do not believe that lead poisoning occurs in their country. Unfortunately there are hardly any publications about the occurrence of the problem.

The northern European population of white-tailed eagles is back from the brink and steadily increasing. The population density is increasing all over the northern European breeding areas and the distribution area of this species is expanding. However, the white-tailed eagle is still far from reaching its original distribution. In southern Europe, for example, the population is either stable or declining. We hope that this species will expand its breeding range further west and south. Also in the Netherlands people expect white-tailed eagles to be breeding in the near future; in Bavaria there was a first pair breeding in the year 2001. The expanse however depends strongly on the success of the breeding and the survival of the white-tailed eagles. Therefore, every single lead poisoned white-tailed eagle is one step backwards in the recolonisation process."

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GREENLAND

JESPER MADSEN, DIRECTOR OF ARCTIC ENVIRONMENT RESEARCH AT THE NATIONAL ENVIRONMENTAL RESEARCH INSTITUTE, DENMARK:

"Human exposure to lead is high in Greenland communities, especially where consumption of shot birds is large. Although there has been no direct evidence of poisoning, our institute will soon publish a report showing that the human intake of lead when eating game that was shot with lead pellets, is much higher than previously thought. In one to two months this report will appear in Danish, and thereafter we will submit an English version to an international journal. No doubt, this will have consequences for the ongoing Greenland decision-making regarding the use of lead shot; a ban is likely to be implemented within a few years.

The Greenland lead shot legislation is regulated by the Greenland Homerule Authorities through their own laws. There has been a very hectic debate and the hunting community reacted very negatively to the proposed legislation. The Homerule wanted it to be implemented within a year; this has now been delayed by at least one year. The ban will mainly affect the Greenlandic population itself, since waterfowl hunting by tourists is limited.

Non-toxic shot is not available in Greenland at the moment, and there haven't yet been any tests of alternatives and their effectiveness in cold climates. However, the distribution of ammunition is in the hands of one company, so this can be arranged relatively easy. The same is true for education campaigns and information materials for hunters: nothing has been undertaken so far but developments are on the way."

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POSSIBLE SOLUTIONS

Several solutions to the lead poisoning issue have been proposed. One considered option was manipulation of the waterbird habitat. If water levels are artificially increased, waterbirds cannot reach the bottom any more, and lowered water levels cause birds to leave the area. Ploughing of wetland bottoms also renders lead shot inaccessible to waterbirds. However, these measures are not only costly and labour-intensive, but they are also ethically questionable as they seriously disrupt entire ecosystems. Moreover, such actions only deal with the symptoms of the problem and not with its causes.

In an attempt to retain the ballistic properties of lead but to reduce its toxicity, lead shot was coated with other metals or materials such as plastic. Some of these layers, however, proved to be equally toxic, and moreover, they were easily removed by the grinding action and acidity of the waterbird gizzard. Clearly, none of these techniques represent a general, effective solution to the problems associated with lead shot. The only sensible, long-term solution appeared to be the replacement of lead shot with alternative, non-toxic ammunition.

"LEAD SHOT HAS BEEN FOUND IN GIZZARDS OF A LARGE NUMBER OF SPECIES. MUD SAMPLES HAVE SHOWN THAT LEAD PELLET DENSITIES ARE VERY HIGH LOCALLY." ***NICOLA BACCETTI***

ITALY

NICOLA BACCETTI, NATIONAL WILDLIFE INSTITUTE (INFS), BOLOGNA, ITALY:

"Lead poisoning caused by hunting is certainly a relevant problem in Italy, a country which has a relatively small wetland surface but a large number of hunters. Evidence of mortality due to acute poisoning is available for large shorebirds and mute swans, but lead shot has also been found in gizzards of a large number of other species. Mud samples have shown that lead pellet densities are very high locally.

Despite the potential relevance of this problem, it only received some attention in the early nineties and has apparently been forgotten in more recent years. The hunters' community initially raised technical objections against a shift to alternative ammunition, presumably as a result of pressure from ammunition manufacturers who represent a politically important lobby in this country. On a legislative basis, nothing has been achieved so far, and nothing will be achieved in the near future unless the federal government is specifically requested to take action.

Another possible strategy for improving the situation could be a specific request presented to all bodies which receive EU funds for site-based nature conservation (e.g. LIFE projects): for example, money should only be given on the condition that if the sites concerned are wetlands, lead shot should be banned within a 10 km radius around them. The latter specification is needed because most sites benefiting from EU funds are tiny, protected sections of larger wetland systems, and applying a lead shot ban just in these smaller areas would be useless."

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ALTERNATIVES TO LEAD SHOT

Shot pellets do not necessarily have to be made out of lead. Several high-quality non-toxic alternatives have been developed so far, and acceptance of these alternatives among hunters has been increasing over the past several years. Examples of alternatives are steel, bismuth, zinc, tin, molybdenum, tungsten and several alloys of these metals. Other metals are either too light, too hard, too expensive, or equally poisonous. The lightness and hardness of the metal determine the ballistic properties of shot, not only in the air, but also within the gun and in the bird. Together with the cost factor, these properties determine the willingness of hunters to switch to non-toxic alternatives.

Steel is the most inexpensive alternative. Prices vary between regions, depending on the demand, which, in turn, is influenced by national legislation. Steel cartridges are on average slightly more expensive than lead cartridges. The alternative considered to be superior and most comparable to lead (tungsten mixed with a polymer substance), however, is often ten times more expensive than lead. Therefore, because of its low cost and ready availability, steel has become the most widely used alternative.

The reason why hunters are still reluctant to switch to steel is that steel has two major disadvantages: it is about one hundred times harder than lead, and its density is one third lower. The hardness causes hunters to believe that steel shot will wear the inside of their guns. This, however, is not true. Gun specialists agree that only older, lighter and already damaged guns may experience some barrel damage when heavier loads are used, but this damage ('ring bulge') is strictly cosmetic and does not pose a threat to safety, nor does it alter the gun's patterning performance. Also, this damage can be prevented by proper use of the gun. However, the hardness of steel may cause the pellets to ricochet off hard surfaces, which may be a safety threat. In wetlands this is not considered to be a major problem when safety regulations are properly followed.

The lower density of steel is a much more important disadvantage. Steel pellets lose their velocity much faster than lead pellets do, which influences their energy on impact and maximum shooting distance. However, experienced hunters agree that 35 meters is the maximum shooting distance anyway, regardless of the type of ammunition.

The use of steel shot may result in an increased pressure in chamber and barrel, since steel pellets are in some cases ('High Performance' cartridges) launched at slightly higher velocities to compensate for their lighter weight (the alternative being the use of larger pellets). These increased pressures, however, are still well within the internationally recognized standard proof pressures. It is therefore important that guns are regularly tested, which, again, is also true when using lead cartridges.

Steel does not only have disadvantages compared to lead. Due to their hardness, steel pellets hardly deform when the gun is fired. This allows for a more uniform shot column in comparison to lead pellets. Lead pellets are always slightly flattened, which increases the risk of crippling birds. In addition, flattened lead pellets with a larger surface pull feathers into the wound, which decreases penetration and reduces the effectiveness of the impact. Therefore, in contrast to what many hunters think, the use of steel shot does not increase the crippling rate. With sufficient practice (indispensable regardless of shot type!), any hunter can shoot just as well with steel shot as with lead shot.

TECHNICAL RESEARCH

FRANÇOIS LAMARQUE, INTERNATIONAL ACTIVITIES OFFICER AT THE NATIONAL HUNTING AND WILDLIFE AGENCY (ONCFS), PARIS, FRANCE:

"There are many misconceptions about alternative ammunition, especially about its impact on guns and its effectiveness. Most of these are not based on true facts. ONCFS carried out a series of large-scale tests of alternative ammunition, together with several partners including the National Association of Waterfowl Hunters and the biological station 'Tour du Valat'.

Various types of non-toxic cartridges e.g. steel, but also bismuth and tin as well were tested during five successive hunting seasons. We checked more than thirty types of commonly used guns, and almost all of those fired between 200 and 1000 cartridges. The objective was to find out the impact on guns and the effectiveness in real hunting situations. To measure possible damage, the guns were regularly screened at the Official Proof House, where it is possible to measure choke dimensions extremely accurately – to the nearest 0.1 mm – and detect even the slightest barrel deformations.

The results were uniform. After five hunting seasons, none of the guns had suffered any significant erosion or deformation. Only guns with the narrowest chokes showed minor distortions after the use of High Performance cartridges. In any case these narrow chokes are known not to be suitable for these cartridges.

The evaluations gathered from the hunters involved varied between 'good' and 'bad', but the results in the field did not indicate any difference between alternative shot and lead shot. The hunters used the same number of cartridges per bagged bird with both types of ammunition. Also, under controlled conditions, the degree of penetration and the pellet pattern showed no significant difference between lead and alternative ammunition at a shooting distance of thirty meters."

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HUNTER

JEAN-PIERRE REYRE, HUNTER AT TOUR DU VALAT, FRANCE:

"In 2005, the use of non-toxic shot will be obligatory in France. This will be in line with the developments in other countries, such as the USA, Denmark and Spain, and with actions that are being considered by the European Union.

Since 1996, initially out of curiosity, and with the help of the Biological Station Tour du Valat, I have been using non-toxic shot as much as possible when hunting waterfowl. This decision, which is purely personal, allows me to be more at peace with myself: hunting, yes, but at the same time respecting the natural environment and not spreading toxic materials.

After having practiced shooting with soft steel, bismuth and other materials, I have concluded that you do need a certain period of adaptation. The hunting practice changes when you switch from lead to steel. In particular, you need to observe four factors: a shorter shooting distance; stronger clustering of the pellets; slightly less penetration; and less favourable shot performance in cold conditions.

It took me two to three years to fully adapt and to find new reference points when hunting. My bag is usually almost as good as when I use lead, although the efficiency is not the same. But who cares about efficiency when hunting is a pleasure?

I have a young son who is a hunter. He uses steel shot and seems to be much better adapted to it than I am.

I am grateful to Tour du Valat for supplying me with non-toxic shot, for this is still very difficult to find on the market."

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"RESULTS IN THE FIELD DID NOT INDICATE ANY DIFFERENCE BETWEEN ALTERNATIVE SHOT AND LEAD SHOT." FRANÇOIS LAMARQUE

MANUFACTURER

FRÉDÉRIC PAVAT, BRAND & PRODUCT MANAGER OF WINCHESTER FIREARMS AND AMMUNITION, BROWNING INTERNATIONAL, BELGIUM:

"Browning International has two main focuses: firearms (Browning, Miroku, and Winchester) and ammunition (Browning and Winchester). We are the exclusive distributor of Winchester ammunition in Europe, the former Soviet Union and Turkey. We have different agents to distribute the ammunition locally.

There are many other ammunition manufacturers in Europe, and there is a very active competition. Apart from Browning, the largest firms are FIOCCHI (Italy), UEE (Spain), Cheddite (France), Gamebore, Eley (UK), Dynamit Nobel (Germany), and Sellier & Bellot (Czech Republic). The big problem in Europe is that the European production capacity is higher than the European consumption. The result is a price war. Still, non-toxic shot is relatively expensive as steel shotshells are on average 15% to 50% more expensive than standard lead loads. This is because there are very few manufacturers who make it.

Generally hunters know very little about alternative ammunition, which is why they are afraid to switch to non-toxic shot. Therefore it is important that large-scale awareness-raising campaigns are set up as soon as possible. The manufacturers, but also the media and national hunting departments, must educate and communicate with hunters and shooters.

Unfortunately, steel or any other material will never perform just like lead. This is indisputable. We can improve the performance slightly, but we are still looking for the famous 'philosopher's stone'. Regardless, hunter and shooters must change their habits. This is the biggest challenge if we want to change to non-toxic alternatives.

Damage to guns can be prevented by proper use of the gun and ammunition. Often the problem lies with the users. Many shooters and hunters are completely ignorant about their own guns. The fear of using steel is a result of that. With the exception of very old or already damaged guns, all guns are suitable for steel shot.

The CIP (Commission Internationale Permanente) is the independent authoritywhich establishes rules for the gun and ammunition manufacturers. The CIP decided that the boxes of shotshells should show three special warnings: "Avoid shooting on hard surfaces, water, roads, frozen water etc..", "Do not use shot n°4 over 1/2 choke", and "Only use steel shot in proofed guns" - normally guns are proofed at 1300 bar. In addition, manufacturers include a chart in the owner manual of the gun, showing what kind of steel shot should be used with each choke.

To sum up, all modern guns (not older than 15 years) can shoot steel shot if the user respects the safety warnings that are written on the cartridge boxes. All guns with removable chokes can shoot steel shot. However, very few hunters know about this.

We, the manufacturers, need to communicate more on this point with the help of the media. My experience is however that the media too know very little about steel shot. Our target is therefore to develop better information networks in Europe, and to promote education and training on steel shot.

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AMMUNITION AND EDUCATION

TOM ROSTER, SHOTSHELL BALLISTICS RESEARCH, DEVELOPMENT AND CONSULTING, CONSEP, UNITED STATES OF AMERICA:

"CONSEP (Cooperative North American Shotgunning Education Program) is an international organisation devoted to research of non-toxic shot load performance with a concomitant mission of reporting those results via educational programmes to CONSEP's professional wildlife community members and their hunter constituents. CONSEP is supported by the annual dues paid by 22 US state wildlife agencies, the US Fish and Wildlife Service, and either the federal government agencies or hunter organisations in the countries of Canada, Australia, Denmark, England (the United Kingdom?) and France. CONSEP is also supported by annual corporate membership dues and other payments in kind from Winchester Division/Olin Corporation and Remington Arms Company.

CONSEP has amassed the world's largest database concerning exterior and terminal ballistics of non-toxic shot. Those data are gathered annually via X-ray and necropsy of thousands of North American waterfowl and upland game birds taken with lead, steel, bismuth and Hevi-Shot. CONSEP has also amassed the world's largest pattern testing database on the performance of lead, steel, bismuth and soon Hevi-Shot in a wide variety of shotguns and choke systems. In addition, CONSEP performs destructive testing of firearms using steel shot.

As data sets become complete, the results of the tests are reported in the form of CONSEP ballistics reports and newsletters. I also travel extensively at the invitation of the various members to address wildlife professionals and hunters at seminars followed by an outdoor workshop which involves shooting skills training, distance estimation training, and pattern testing. Lastly, CONSEP offers an annual weeklong training session to wildlife professionals and hunters seeking a thorough background in the use of non-toxic shot.

CONSEP now continues its non-toxic shot performance research because there are new non-toxic shot types other than steel shot. But, CONSEP has also expanded into working on a proactive educational programme to help waterfowl and upland bird hunters significantly reduce wounding losses. Wounding is a larger waste of birds and more threatening to the future of bird hunting than lead poisoning ever was.

My own personal experience with non-toxic shot in terms of effectiveness would have to be broken down into shot type. Based on 25 years of research and personal usage in this area, I would summarise the issue as follows:

- *equal in effectiveness to lead shot: bismuth and the various tungsten-based pellet types*
- *equally effective with adaptation, learning, some changes in shot size used and choke: steel shot*
- *more effective: Hevi-Shot*
- *less effective: tin-based shot.*

The impact of non-toxic shot on guns is a very complicated issue and usually would take an hour to explain.. In a nutshell, there is no longer any issue concerning bore erosion as long as any pellet type harder than lead is contained in a properly designed shotcup system. This includes steel, cheap steel, and some of the tungsten-based pellets. As far as slight (but avoidable with education) bulging 'damage' to chokes or choke tubes is concerned, only steel shot, cheap steel, tungsten-iron shot, and Hevi-Shot are issues. Even here the so-called damage is either cosmetic or avoidable but I would have to go into details concerning shot size versus specific brand of integral choke or screw-in choke tubes being considered. In Europe, there is also the issue of shotguns that are not proof tested to as high chamber pressure limits as American-made shotguns."

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To sum up, lead shot is not necessary for hunting waterbirds. Steel shot is a high-quality alternative. It is non-toxic, kills equally well with proper hunting practice, does not damage guns, nor poses a threat to safety when safety regulations are observed. Why, then, has lead shot not immediately been phased out in all countries?

This question has of course many answers. There are numerous factors mainly of an organisational nature which are specified below that impede the efficiency of a large-scale operation like phasing out certain ammunition. Therefore, solving the issue requires an interdisciplinary approach, and to that end a few international projects have been initiated over the past years.

In 1982, the International Association of Fish & Wildlife Agencies (IAFWA) initiated a Cooperative Lead Poisoning Control Information Program (CLPCIP), in 1996 renamed Cooperative North American Shotgunning Education Program (CONSEP). The objectives of this programme (see also the text box above) are to conduct research with regard to the use of non-toxic shot, and to organise workshops and training sessions aimed at promoting awareness among hunters and provide them with the skills necessary to successfully change to using non-toxic shot. The CONSEP workshops and training programmes serve as an example for governments and agencies worldwide to educate and train their hunters.

One of the first international initiatives to discuss these factors amongst a broad spectrum of interested parties, was a workshop convened by the International Waterfowl and Wetlands Research Bureau (IWRB, now Wetlands International). This workshop was held in 1991 and the proceedings emerged in 1992. These still serve as a standard overview of the issue, and include essays about physiological, ecological, technical and organisational aspects.

To address the need to map persisting impediments and to assess the current situation in the Range States, the AEWA Implementation Priorities require the appearance of regular reviews of the issue. Wetlands International was requested to prepare these reviews, with financial support from AEWA and the UK Joint Nature Conservation Committee. Three such reviews have been published so far, and the latest report, entitled Lead Poisoning in Waterbirds. International Update Report 2000, appeared recently. This report describes the background of the issue, its scale, biological consequences, possible solutions as well as the advantages and disadvantages of the use of non-toxic shot. Furthermore, it reviews the major international conventions and agreements addressing the lead issue, and the developments which have been achieved. However, the main part of the report deals with the current situation and developments in individual countries.

For this section, a total of 137 countries and 11 organisations were queried, of which 74 and 9 responded, respectively. Through detailed questions and short essay sections, the national contacts were asked to provide information on the current situation in their country concerning general situation, policy and legislation, awareness and education, research and development, co-ordination, and relevant references. Organisations and convention secretariats were asked to describe new developments in policies and legislation.

RUSSIA

EVGENY KUZNETSOV, SENIOR SCIENTIST AT THE RESEARCH INSTITUTE FOR GAME MANAGEMENT AND RESEARCH INSTITUTE FOR NATURE PROTECTION, HUNTER AND LEAD POISONING EXPERT:

"During the past decade, Russia has been in a very unstable socio-economic position. A large part of the population has been facing increasing poverty. Thinking about environmental matters is not top on the list of priorities. Furthermore, the only method of preventing lead poisoning is using steel shot, which is at least twice as expensive. The cost of cartridges is reason for hunters and governmental officials not to address the question of lead poisoning.

First we need to increase awareness of the problem within Russia. There is a lot of data available, mostly from abroad, so we can publish articles in hunting magazines, newspapers, etc. However, this will not be sufficient, since we still need to carry out research on the scale of the problem in different parts of Russia. If we don't prove the seriousness of the problem in Russia, people will not easily be convinced.

I believe that the problem could be solved within five years if western countries helped us to fund research. Co-operation would be very useful, but we would have to discuss what would be the best way.

In brief, I am convinced that a lot is possible, in Russia as well. It all depends on the effectiveness of some enthusiasts' communication with key persons in different federal bodies. In other European countries this process is easier due to closer contacts with western countries and, in some cases, due to obligations under AEWA."

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SPECIFIC PROBLEMS HIGHLIGHTED BY COUNTRIES

In addition to the questionnaire's 'yes/no-questions', which gave an idea about why the issue might be hard to solve, some countries indicated specific problems concerning the lead poisoning issue:

- There is either no awareness of the problem, or a disbelief in the harmful impact of lead on the environment (named 37 times).
- There is an awareness of the problem, but it is, whether rightly or not, considered to be of minor importance, e.g. hunting is a very small-scale activity; lead sinks into the bottom and becomes inaccessible to birds; only terrestrial species are hunted (named 21 times).
- There is an awareness of the problem, but a lack of expertise, finances and logistics inhibit developments (named eleven times).
- The scale of the problem is unknown. There is a need for research, but financial and logistical problems inhibit developments (named nine times).
- Legislation, awareness campaigns, research and/or co-ordination are being considered, but due to bureaucratic reasons this process is very slow (named nine times).
- Even though there is legislation concerning the use of lead shot, or concerning hunting in general, there is a lot of illegal hunting. Effective enforcement is not possible because of a lack of finances and logistics (named seven times).
- The lead poisoning problem is not on the priority list for political reasons, e.g. war, transition period, political unrest (named three times).
- Non-toxic shot is either not available, or disproportionately expensive because the demand for it is too low (named three times).
- The production of non-toxic shot is prevented by manufacturers who determine the market and have strong political power (named twice).
- There is a lack of co-operation and communication between hunters' organisations and authorities. Hunters indicate that authorities are too rigid in imposing legislation, while they ignore the cost, effectiveness, and safety aspects of steel shot. Hunters also claim that there is insufficient support with regard to education and practical workshops, and that gun proofing facilities are lacking. Authorities report that hunters are reluctant to switch to steel shot for traditional reasons and prevailing misconceptions, which they seem unwilling to overcome (named once).

"LEAD IS AN EXTREMELY TOXIC SUBSTANCE. MILLIONS OF WATERBIRDS ARE ESTIMATED TO DIE OF LEAD POISONING EACH YEAR." BAZ HUGHES

INTERNATIONAL HUNTING COUNCIL

DIETER SCHRAMM, PRESIDENT OF THE INTERNATIONAL HUNTING COUNCIL (CIC):

"Lead is a non-biotic material, which can be toxic when spread in the environment. Lead shot dispersal through hunting has proven to affect waterbirds feeding in wetlands – resulting in a significant percentage of deaths among the populations of many species of waterbirds. At the same time, lead is a useful material, which has been used in the industry for centuries, not least in the production of bullets and shot for hunting purposes. The community of hunters and wildlife managers therefore has a task of weighing the toxicity of lead against its usefulness. Many national governments have addressed this problem and have implemented, or started to implement, a phase-out of the use of lead shot for hunting in wetlands. AEWA has, through its Action Plan, put a focus on this – an initiative which is fully endorsed by CIC.

The hunters are the main stakeholders in this question. The responsibility to adapt to alternatives should be left to them. In this respect the bottleneck is the availability of acceptable alternatives. Alternatives have already been developed in countries where the use of lead shot has been restricted. However, governments and national and international representatives of hunters should, in co-operation with manufacturers and dealers of shot cartridges, be encouraged to further address the development of alternatives that fulfil all demands of the hunting interest.

Governments, nature conservationists and hunters need to co-operate on a national and international level. That is the only way in which the process of phasing out lead shot in wetlands can be successful. CIC is ready to take up this challenge."

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MAURITANIA

CHEIKH HAMALLAH DIAGANA, CONSERVATION OFFICER AT DIAWLING NATIONAL PARK, MAURITANIA:

"Hunting waterbirds is currently not a large-scale activity in Mauritania, although its scale has been increasing over the past few years. The Hunting Laws prohibit the use of toxic ammunition both for large game hunting, which was banned in 1975, and for sports hunting, but there are no measures taken explicitly for the monitoring of non-toxic shot. However, the general hunting ban and the area and time restrictions on hunting waterbirds, as well as the rules set by the hunters' association, are aimed to discourage the use of toxic shot.

The hunting of migratory birds and waterbirds is authorised by a Decree issued by the Minister of the Environment in which the hunting period, quota, and species to be hunted are specified. Hunting is generally done by expatriates (experts, diplomats, etc.) operating under the hunters' association, which is therefore an interlocutor between the Administration and the hunters, and responsible for all illegal acts.

It is difficult to monitor hunting activities in wetland areas open for controls (Lac d'Aleg, Lac de Mâle) during the hunting season, or to assess whether legal measures are enforced effectively, since the responsible authorities lack the necessary people, materials and finances. To improve this, there would need to be more support in terms of logistics and resources, which are necessary to ensure the sustainability of hunting during the hunting season, and to combat poaching during the rest of the year. Law enforcement is up to the Administration; hunters and residents should be educated about how to abide by the regulations. An assembly, uniting the authorities and the individuals concerned, would be helpful to put the laws into effect.

The Research Group on Wetlands in Mauritania (GREZOH) takes an interest in environmental issues. A project is being developed on the ecobiology of certain waterbird species in the lower delta of Mauritania. Part of this project will focus on lead poisoning in waterbirds. Unfortunately this project has not yet received financing."

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CURRENT SITUATION

54% of countries responded to the questionnaire that formed the basis of the above-mentioned Lead Poisoning Update Report (74 out of 137). Of AEWA Contracting Parties, 72% responded (23 out of 32). Seven countries reported to have a total statutory ban on the use of lead shot for all waterbird hunting: the USA, plus AEWA Range States Canada, Norway, Finland, Denmark, The Netherlands, and Switzerland, the last four being Contracting Parties to AEWA. In several countries there is a partial ban on the use of lead shot for waterbird hunting: there is a ban in certain (protected) areas, or for hunting certain species (see table).

Table: current legislation status in responding countries in the year 2000:

COUNTRY	STATUS	COUNTRY	STATUS	COUNTRY	STATUS
Canada	A	Cameroon	D	Egypt	F
Denmark	A	Chile	D	Gabon	F
Finland	A	Congo	D	Hungary	F
Netherlands	A	Iceland	D	Iran	F
Norway	A	Ireland	D	Italy	F
Switzerland	A	Kenya	D	Kuwait	F
USA	A	Lithuania	D	Mali	F
Australia	B	Luxembourg	D	Moldova	F
Belgium (Flanders)	B	Malawi	D	Namibia	F
Cyprus	B	Malta	D	Peru	F
Ghana	B	Mauritania	D	Thailand	F
Israel	B	Morocco	D	Ukraine	F
Japan	B	Romania	D	Gambia	U
Latvia	B	Slovak Republic	D	Algeria	N
Malaysia	B	Zimbabwe	D	Cape Verde	N
Russ. Federation	B	Botswana	E	India	N
South Africa	B	Czech Republic	E	Lebanon	N
Spain	B	France	E	Liberia	N
Sweden	B	Greece	E	Monaco	N
United Kingdom	B	Albania	F	Sri Lanka	N
Germany	C	Bosnia Herz.	F	Sult. of Oman	N
Argentina	D	Brazil	F	Togo	N
Austria	D	China	F	Uganda	N
Belarus	D	Croatia	F	Un. Arab Emirates	N
Cambodia	D	Ecuador	F		

*A = There is a **total statutory ban** on the use of lead shot for waterbird hunting*

*B = There is a **partial statutory ban** (certain species, certain areas) on the use of lead shot for waterbird hunting*

*C = There is a **voluntary ban** on the use of lead shot for waterbird hunting*

*D = There is **no statutory or voluntary ban, but waterbird hunting is only a (very) small-scale activity***

*E = Waterbird hunting is a medium/large scale activity. There is no statutory or voluntary ban, but there is an awareness of the problem and **legislation is being considered***

*F = Waterbird hunting is a medium/large scale activity. There is no statutory or voluntary ban, nor any awareness of the problem; **legislation is not being considered***

*U = It is **unknown** to the compiler of the information whether lead shot is used for waterbird hunting, and whether there is any legislation concerning the use of lead shot*

*N = There is **no waterbird hunting at all**, for whatever reason (e.g. no wetlands, total ban on all hunting, or no reason given)*

When comparing these results to those of the two previous Update Reports which were published in 1995 and 1997, it becomes apparent that 38% of the countries that responded in more than one year made progress concerning their regulations. The progress of AEWA Contracting Parties was not significantly different from this overall percentage. However, when looking at the overall situation, and not merely at the development over time, it appears that the percentage of countries that currently have statutory or voluntary regulations, is in each of the three years higher than that of non-AEWA countries. Currently, 67% of AEWA Contracting Parties have either statutory or voluntary regulations concerning the use of non-toxic shot. For all responding countries combined, this percentage is 28.

The majority of respondents reported a medium amount of lead currently present in their wetlands, on an arbitrary scale. In 82% of countries lead shot is being used for hunting waterbirds, while 28% report to have regulations concerning its use. Of the latter group, 65% report monitoring activities and 55% have effective enforcement of regulations. Of all respondents, 40% reported new legislation to be on the way. Remarkably, new legislation is on the way in 70% of countries that already have some legislation, but only in 27% of countries that do not.

Only in 41% of responding countries is there is an awareness of the problem. The percentage of countries that report to have (had) media/education campaigns, information materials, research projects, non-toxic shot development and special working groups remains between 19% and 33%.

EUROPEAN HUNTING ASSOCIATION

DR. YVES LECOCQ, SECRETARY-GENERAL OF THE ASSOCIATION OF HUNTING FEDERATIONS & CONSERVATION OF THE EUROPEAN UNION (FACE):

"The FACE position on lead shot has hardly changed over the years. We still believe it is not a major conservation problem, but it is a case of 'unwise use' of a renewable natural resource and therefore bad for the public image of hunting.

FACE is strongly opposed to any attempt of broadening the scope to areas other than wetlands, as this is not justified at all from an ecological point of view. We believe however that once hunters get used to non-toxic cartridges in wetlands, and these become of better quality and less expensive, as well as safer for the users, hunters will also start using them in other habitats.

FACE believes that a voluntary switch to non-toxic shot, supported by information and awareness-raising campaigns, is more likely to result in satisfactory results than legislation which would be imposed without consulting the hunters.

The key question remains the technical aspect of the non-toxic alternatives: killing power, range, impact on gun barrels, risks of ricocheting, availability, and price. The industry/trade sector needs to become more involved in all this, and from that point of view, an appropriate legal framework and realistic timetable might be helpful.

In our opinion AEWA should continue to focus its efforts on information and awareness-raising, as well as encouraging research on technical developments."

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SPAIN

DR. RAFAEL MATEO, ASSISTANT PROFESSOR IN TOXICOLOGY, AUTONOMOUS UNIVERSITY OF BARCELONA:

"Prevalence of lead shot ingestion is above 50% in two migratory species of waterfowl, namely the Northern Pintail and Common Pochard, in their wintering wetlands on the Mediterranean coast. Other species such as the Marbled Teal and White-headed Duck are also highly exposed to lead shot. This may explain the observed decline in the European populations of these species.

This problem is large compared to other parts of Europe. The situation in the Ebro Delta and Albufera de Valencia in Spain does not differ from the Camargue in France or wetlands in Italy or Greece. Measures taken in the northern countries in the Palaearctic flyway should also be implemented in the south.

Unfortunately, the most important regions in Spain for waterfowl hunting (Catalonia, Valencia and Andalucia) have implemented moratoriums of one or two years to the nation-wide lead shot ban of 2001. In the case of Catalonia, where the Ebro Delta is located, the lead load in cartridges has been reduced in 2001/2002 to 34 grams and in 2002/2003 to 32 grams within protected areas. Lead will be completely banned in the entire Delta including areas not managed by the Park service. The nation-wide ban, however, only applies to Ramsar sites or other places with a protected status. Rice fields around the protected areas, for example, are not included. In the Ebro Delta, hunters made an agreement with the Catalan government to ban lead shot also in non-protected areas by 2003/2004. Gradually, alternative shot is becoming available in the Delta.

Legislation should take into account the ecology of the waterfowl concerned. For example, it is not very useful to ban the use of lead shot in a lagoon where birds are only resting, and not in the adjacent rice fields where they are feeding.

In my opinion, hunting federations and governments should co-operate to make information available on the use of alternative ammunition, and explain that a lead shot ban does not aim to discourage waterfowl hunting. On the contrary, its aim is to preserve this activity. I think it surprising that some groups or researchers consider lead poisoning a minor problem. I think this is in part because not much research is being done on this issue in Spain.

In short, I believe there is no reason to shoot with lead over wetlands. Many countries have been using alternatives successfully for decades. A lead shot ban in upland areas should also be considered, because endangered raptors are at risk."

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A RECENT CO-ORDINATION INITIATIVE:
WORKSHOP IN ROMANIA

The AEWA Secretariat and the Federation of Hunting Associations of the European Union (FACE) jointly organised a Non-Toxic Shot Workshop in Bucharest, Romania in October 2001. The workshop aimed to raise awareness of the lead poisoning issue among the hunting community and governmental agencies in Central and Eastern Europe. The meeting was attended by delegates from Romania, Hungary, the Czech Republic, Slovakia, Slovenia and The Ukraine and furthermore by speakers (representing conservation organisations, hunting federations and guns and ammunition manufacturers) from the United Kingdom, Denmark, France, Belgium, and the Netherlands.

In short, the topics that were addressed at the workshop were:

— Presentation of the Update Report named above (Ms. Nienke Beintema, Wetlands International)
— Internal and external ballistics, safety, efficiency, cost factors, availability and future development (Dr. Martin Tulp)
— The manufacturer's perspective (Mr. Frédéric Pavat, Browning International)
— Problems related to the use of lead shot and its alternatives - the French experience (Mr. François Lamarque, National Hunting and Wildlife Agency)
— Experiences with the phasing-out of lead shot - the Danish example (Mr. Niels Kanstrup, Danish Hunters' Association)
— Practical use of non-toxic shot alternatives – situation in the UK and USA (Dr. John Harradine, British Association for Shooting and Conservation).

The participants agreed on the formulation of the following Workshop Outcomes: In order to avoid unnecessary deaths of waterbirds because of poisoning through the ingestion of spent lead shot, and the resulting contamination of the environment, the participants recommended that the phasing out of lead shot over wetlands, in accordance with the international commitments under AEWA, should be speeded up by:

"GRADUALISM WITH CLEAR TARGETS AND IMPLEMENTATION DEADLINES OVER A REASONABLE PERIOD OF TIME MAY BE THE ONLY RIGHT AND REALISTIC ANSWER." ***SERGIU CELAC***

- Increasing international co-operation (with AEWA, FACE, CIC, CIP, manufacturers, etc.) to achieve the objective
- Collecting existing information and disseminating it through appropriate networks (AEWA, FACE, CIC) to those countries yet to phase out lead shot
- Encouraging investigations, where appropriate, to assess the scale of ingested lead shot poisoning at the national level
- Developing guidelines, based on existing experience, to address the specific requirements of developing countries and those with economies in transition
- Raising awareness about the problem and possible solutions among user groups and decision-makers, through
  - material for grassroots-level in appropriate languages (leaflets/hand-outs, etc.)
  - special issues of AEWA/FACE/CIC newsletters
  - hunting magazines, etc.
- Educating and training of hunters in the effective use of non-toxic alternatives
- Facilitating and encouraging improvement of shooting through practising at shooting ranges, etc.
- Standardising product description by cartridge manufacturers
- Encouraging the local manufacture of non-toxic cartridges
- Creating incentives for introducing alternatives
- Encouraging further development of effective non-toxic shot
- Finally, participants recommended that hunting interests be fully represented in all debates and developments concerning the future use of lead shot in east European and other countries.

The following day, a practical session took place at a nearby shooting range in Bucharest. This event started out with a short demonstration of the function of a shooting range to the participants, followed by the opportunity for everybody to practice trap shooting with the provided shotguns. Later on, panels were used to demonstrate patterning and penetration of lead and steel shot at various distances. Explanations were given by the guest speakers.

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WORKSHOP PARTICIPANT: ROMANIA

SERGIU CELAC, FORMER PRESIDENT (1990-1993) OF THE ROMANIAN HUNTERS' AND ANGLERS' ASSOCIATION, AND ALTERNATE ROMANIAN REPRESENTATIVE TO FACE:

"The level of awareness of the lead poisoning issue among hunters in Romania is pretty low – actually, the issue is hardly known beyond a relatively narrow circle of professionals. Little has been done so far on either the regulatory or the awareness-raising side. Many hunters are aware of the lead poisoning risk but are not happy with the proposed solutions. They cannot afford to buy new shotguns, and they find the cost of non-toxic shot prohibitive and its performance disappointing. Also, there are new, hitherto unknown hazards such as breaking teeth on steel shot.

Therefore in addition to legislation, communication and awareness are important when addressing the issue, but we still have to be conscious of the fact that proper enforcement will take time and will largely depend on the availability of reliable, cost-effective and user-friendly alternative solutions. Gradualism with clear targets and implementation deadlines over a reasonable period of time may be the only right and realistic answer.

Reports on the findings of the AEWA/FACE Non-toxic Shot Workshop in Bucharest, in October 2001, organised in co-operation with the Romanian Association of Hunters and Anglers, were published in the national press and specialist publications. Legislative action will have to be undertaken soon since Romania has opened the file on environmental issues in its accession negotiations with the European Union. International technical assistance in drafting the adequate regulatory framework and preparing the required enforcement capability is crucial. Most importantly, we need practical examples of best practice for the preparation of realistic action plans to phase in the new regulatory requirements.

In addition to the action taken by intergovernmental institutions and non-governmental organisations, I think that a great deal of responsibility also falls upon the shoulders of the manufacturers and distributors of new guns and ammunition. Aggressive, and truthful, commercial advertising, including subsidised demonstration events can prove to be a lot more effective than rigid enforcement measures.

My view may be technically naive, but I think that more inventive technological research and development by the relevant industries, with government and EU support, may bring forth reasonable answers. One such cost-effective solution could possibly be that of providing traditional lead shot with an indestructible non-toxic coating."

WORKSHOP PARTICIPANT: THE UKRAINE

DR. VASILIY KOSTYUSHIN, WETLANDS INTERNATIONAL – BLACK SEA PROGRAMME:

"The Ukraine is a densely populated country with hundreds of thousands of hunters. In some regions, lead poisoning is therefore a serious problem. Ukrainian scientists have found some evidence of this, but we lack the data that is necessary to evaluate the situation for the whole country.

The problem is very difficult to address in the Ukraine. The majority of hunters do not want to acknowledge that there is a problem, because often their guns are quite old and not suitable for steel shot.

No matter how the problem is approached, it will take years and years before anything is likely to change. For a start it is necessary to raise awareness among hunters and the public, and only then should we try to make changes in legislation. Also it is very important that special research is conducted to evaluate the scale of the lead poisoning problem in the Ukraine. International data, for example from Germany or Denmark or England (The United Kingdom?), will be much less convincing to our hunters than sound Ukrainian data.

It is really important that we develop an information network. During the first three to five years, funds should be used mainly for events such as workshops, meetings and study tours, and the production of information material such as posters, brochures, radio and TV programmes. At the moment only very few hunters are willing to make changes. Nature conservationists should develop contacts with this category of hunters and use them to 'recruit' hunters for this 'new religion' (i.e., steel shot hunting) and change the hunters' mentality.

During the Non-Toxic Shot Seminar in Bucharest I received a lot of new information. I am planning to use this to prepare several projects aimed to raise hunters' awareness regarding lead poisoning and non-toxic shot. Also I made several valuable contacts with specialists of this problem. It would be ideal if at least one non-toxic shot workshop could be held in the Ukraine, which would bring together Ukrainian and foreign hunters and conservationists. That would be an important and stimulating first step."

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WORKSHOP PARTICIPANT: CZECH REPUBLIC

FRANTISEK HAVRANEK, INSTITUTE OF WILDLIFE MANAGEMENT, PRAGUE, CZECH REPUBLIC:

"I consider the lead poisoning problem in the Czech Republic to be relatively serious – the numbers of ducks (Anas platyrhynchos) have generally decreased. Annually the number of bagged waterbirds is about 236,000. Many of those come from duck farms: every year at least 200,000 birds bred in captivity are being released for hunting purposes. We discovered that 1.5 % of all ducks shot in the Czech Republic have lead pellets in their stomachs; among farm birds released for hunting this percentage is 0.58, but in wild birds the percentage is 8.7. In other words, the natural population is more affected. Birds shot on rivers had no pellets in their stomachs.

I do not think it is difficult to discuss this problem with Czech hunters. In 1999 the hunters' clubs organised on their own initiative a conference on toxic shot and its influence on littoral ecosystems. They published a number of reports and papers, and also organised a practical demonstration. Many articles appeared in professional hunting journals.

The practical application of non-toxic shot will probably not make the hunters enthusiastic, but it will be accepted as a necessity that must be laid down in hunting legislation. From various reasons, I do not consider it effective to involve nature conservationists in this problem. Preferably, the solution should be solved by hunters and within the framework of their organisations.

Non-toxic pellets are not easily available on the market, as there is not much demand for them. However, the Czech company, Sellier & Bellot, is prepared to meet our demand.

The legislative protection of water ecosystems in the Czech Republic is currently approaching an international level: it corresponds with that one of our neighbouring countries (Germany, Austria etc). Only some legal modifications have to be carried out so as to guarantee the implementation (79/409/EEC, 92/43/EEC etc.)

The Bucharest workshop has extended our international contacts and brought some new information? which has been forwarded to the respective divisions at the Ministry of Agriculture, Ministry of Environment and many hunting organisations. In my opinion, the participants of the Bucharest workshop have become familiar with the topic. The next step is to organise similar workshops on national levels together with international experts so that as many hunters as possible are involved."

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WORKSHOP FOLLOW-UP

A first overview on the outcomes of this exercise was presented by FACE at the Second Meeting of the AEWA Technical Committee, held 5-7 November 2001 in the Carmargue, France. Under the agenda item »Report on the Non-toxic Shot Workshop«, Wetlands International first presented a brief overview on its recently published update report, followed by a presentation given by FACE on the Workshop in Romania. The AEWA Secretariat and the participants welcomed the initiatives taken by AEWA and FACE and also the improved co-operation between these two organisations. The AEWA Secretariat suggested to the Technical Committee to organise another workshop targeting the Southern European Countries. This workshop will be held in Italy in early 2003, in co-operation with national and international hunting organisations.

In summary, at the Camargue meeting the following steps were agreed to be taken:

- Establishment of a body under the AEWA umbrella, to secure international co-operation in order to achieve the objective of phasing out lead shot. Within this body, the following main stakeholders should be represented: FACE, CIC, Wetlands International, BirdLife International, CIP, manufacturers, etc.
- Collection of information in countries where the scale of incidence of lead poisoning is still unknown. This can be done by using the extensive network built up by Wetlands International to gather the data for the 2000 update report. FACE and CIC can address their hunters' network.
- Developing guidelines, based on existing experience, to address the steps that can be taken towards the phasing out of lead shot, in particular of developing countries and those with economies in transition
- In addition, raising awareness about the problem and possible solutions among user groups and decision-makers
- Educating and training of hunters in practices of the effective use of non-toxic alternatives
- Standardising product description, including safety features, by cartridge manufacturers
- Creating incentives for introducing non-toxic shot alternatives; encouraging the local manufacture and encouraging the further development of effective non-toxic shot

WORKSHOP PARTICIPANT: HUNGARY

GERGELY TORDA, AUTHORITY FOR NATURE CONSERVATION, MINISTRY OF THE ENVIRONMENT, HUNGARY:

"In Hungary we are still at the very beginning of the long process of replacing lead shot with non-toxic alternatives. Generally, Hungarian hunters are fully unaware of the lead poisoning issue, and almost none of them use non-toxic shot. Although there have been some studies on the lead poisoning issue, the exact extent of the phenomenon is not known. We are currently initiating a research project to gather more information on this.

Hungarian hunting traditions are strong and hunters are not open to change. As hunting regulations become stricter all the time, the hunters' approach to nature conservation is rather negative.

The other main difficulty is a financial one. Shifting from lead to non-toxic alternatives entails financial consequences, as regards both ammunition and weapons. The majority of Hungary's ca. 40,000 hunters cannot afford to buy a new shotgun for shooting high performance alternatives, nor can they afford to purchase non-toxic cartridges that are four or five times more expensive than lead shot.

With the Hungarian Ministry for the Environment as a leading partner, a professional working group has been established to co-ordinate the transition. We are going to conduct awareness campaigns, practical demonstrations and legislative background projects. The Hungarian Hunters Association is involved in these actions, so I propose any further action should be first communicated to this body to evaluate its role and possible co-operative involvement. We, of course, encourage every attempt to facilitate the introduction of the ban, from the side of both hunters and nature conservationists.

Despite the establishment of this working group, we face some yet unsolved problems, mostly financial ones. Therefore financial help to carry out the necessary research and to organise demonstrations and informational meetings for hunters would be a great help. Regarding the cost of cartridges we might be able to subsidize non-toxic shot, and add a due to the price of lead shot, but the issue of hunters having to buy new guns remains unsolved.

The European Hunters' Association (FACE) could also play an important role. One of our main problems is that hunters do not have confidence in nature conservationists. Therefore if FACE contacted the Hungarian Hunters Association regarding the lead poisoning issue, and informed them about the seriousness of the problem, the campaigns would probably be better received.

I think the workshop in Bucharest was excellent and could serve as an example for future workshops. I have used much of the information that I acquired, for example in some presentations that we gave about lead poisoning and corresponding issues to hunters. The information was also useful in the negotiations with the Ministry of Agriculture about a possible date for banning lead shot in wetlands, and for the negotiations with other interest groups.

Taking all this into consideration, I believe that the problem will eventually be solved in Eastern Europe. It is already on the task list of national nature conservation authorities, but it might need some extra time."

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FURTHER AGREEMENT STEPS

The AEWA Technical Committee will meet again in Tanzania, 26-28 May 2002. The lead poisoning issue will be one of the agenda items: the outcomes of the workshop in Romania will be discussed further, as well as the possibilities of establishing a special working group under AEWA umbrella, see above.

Also, the Technical Committee will discuss a Resolution draft that deals in particular with this issue, and that will be evaluated and hopefully accepted at the Second Meeting of the Parties in Bonn, Germany, 25-27 September 2002. The Resolution draft proposes, among others, to continue the process of phasing out lead shot and to render this more feasible by introducing legislation in distinct phases. Also, the Resolution draft proposes actions to ensure communication and co-operation, particularly concerning the exchange of expertise, logistics and finances.

INTERNATIONAL NATURE CONSERVATION

DR. GERARD C. BOERE, INTERNATIONAL PROGRAMME CO-ORDINATOR, WETLANDS INTERNATIONAL:

"Lead poisoning is an important issue to address internationally as it concerns short and long distance migratory waterbirds. The proven effect of the poisonous character of lead (pellets from hunting as well as lead fishing weights) makes it necessary that the use of lead pellets is abandoned throughout the entire flyway. Measures in only a few countries are not sufficient as the birds can pick up lead in another country during their annual migration.

This also makes it difficult to solve the problem. The flyway addressed by the African Eurasian Migratory Waterbird Agreement includes many countries, with considerable differences between them. The capacity and resources among countries to solve this problem are much greater in Europe than in many African countries, the latter having quite different priorities. Hence there is a need to assist these countries in solving the problems, because otherwise, as indicated above, the effect of measures in other countries is lost when the birds reach their wintering areas. Results may be easier to achieve in flyways that involve only a few countries, as is the case in North America.

I strongly believe in a two-way approach: education and communication together with the development of international legislation. In my long-term experience of applying international treaties and conventions, I have experienced that setting clear and measurable targets put down in resolutions or even supra-national legislation (as with the EU Bird Directive) is the best way to proceed. In order to achieve a positive result, all stakeholders should be kept well informed of this and the channels of communication should be kept open. Of course the targets and timeframes should be realistic and mechanism should be in place for guidance and follow-up.

Subsidizing the production and distribution of non-toxic alternatives to encourage their use, is in my opinion not the right way to go about it. The toxicity of lead shot to waterbirds has been proven beyond any doubt and furthermore its use is not an absolute necessity. So when a Government adopts legislation to phase out the use of lead shot, it is the responsibility of the hunting community to comply with the regulations. It is a different situation in countries like Russia, where hunting is in many cases an important means of subsistence. People in Russia often produce their own lead shot at home, which is impossible with other materials. Therefore a country's situation with respect to this issue should be evaluated on an individual basis. However, in general I do see it as a responsibility of Governments to provide the resources for the necessary research and monitoring of a change from lead shot towards non-toxic alternatives.

From the beginning, Wetlands International (and its predecessor IWRB) has played an important role in putting the issue on the international conservation agenda and providing the necessary background information through its research networks and specialist groups. This role should be continued through regular updated reviews of the issue of lead poisoning on the global level and providing information and guidance to all stakeholders. Co-operation with other conservation organisations exists, but given the fact that the problem is very dominant among waterbirds, Wetlands International has always been seen as the leading organisation on this issue.

In addition, Wetlands International should collect data on the effect of legislation, education and awareness campaigns on the use of lead shot. Wetlands International should encourage countries to monitor the assumed reduction of lead poisoning in waterbirds once the lead shot has been phased out and alternatives are in place. Such monitoring is needed anyway, as it is unlikely that large countries such as the Russian Federation and many African countries, will, in the near future, be in a position to ban lead shot. The effect of lead shot poisoning of waterbirds in a large hunting community, may still be rather substantial, on the flyway level as well.

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NORWAY

ØYSTEIN R. STØRKERSEN, SENIOR ADVISER, DIRECTORATE FOR NATURE MANAGEMENT, NORWAY:

"In many areas in Norway, the level of lead in the environment is far above the normal or expected levels. Lead deposition in Norway is mainly caused by hunters: 72% of the annual deposition is caused by the use of shotguns. Research shows that lead pellets take 15-70 years to dissolve, depending on the environmental conditions. The research also showed that huge numbers of waterbirds are lethally, though unintentionally, affected by the ingestion of lead pellets. There are two main reasons to avoid the use of leaded pellets, and the acceptance of those seems to be widespread: there is the animal welfare issue – lead poisoning occurs when waterbirds ingest lead pellets – and the unnecessary spread of huge amounts of lead into our environment. Since substitutes exist, it is widely accepted that these should replace lead ammunition.

However, since hunters are traditional in their choices, the shift towards the more environmentally friendly substitutes (like bismuth, tungsten, molybdenum, steel or a mix of these and other materials) has been very slow. Among hunters there is a perception that lead pellets are more suited for use with shotguns, and that their ballistics are superior to those of other substances (e.g. a smaller chance of ricocheting, a higher energy on impact, and wider spreading after firing). In Norway studies of the properties of lead pellets, various types of non-toxic pellets and their ballistic properties, have concluded that alternative pellets do no harm to most shotguns, but that they may in certain circumstances behave differently compared to lead pellets after being fired. However, several tests show that the risk of being hit by a ricocheting alternative pellet is almost zero, and that a smaller spread of the pellets may actually be an advantage when hunting certain species. In conclusion, reports state that the alternative pellets are good enough to recommend a shift.

In 1991, the Norwegian hunters' association entered a 10-year agreement with the national nature protection authorities to voluntarily phase out the use of lead pellets for all hunting. Regrettably, monitoring showed that only a drop of a third was achieved within that period. A part of the agreement was also that if the set targets were not met with a certain minimum (80%), the authorities would enforce new legislation. Having set a ban on the use of lead pellets in wetlands in 1991, the ban has consequently been extended to shooting ranges as of July 1st 2002 and finally all use and import will be banned by January 1st 2005.

Through an annual booklet sent to all hunters in Norway, the hunting community has been able to follow and discuss the development of this process and to read about the tests and experiences with different substitutes. Through such distribution of information on the advantages to both wildlife and humankind of reducing the use of lead, our impression is that most people accept the idea, but still they are slow to act. Because of this, the time seemed ripe to help the public make the right choice by implementing new legislation. The Norwegian experience shows that it may be a long and slow process to phase out the use of lead pellets through voluntary systems. It is important to use innovative ways forward and to co-operate closely with national hunting organisations. On a regional or global scale it would seem ideal to also achieve a consensus through various relevant conventions and to involve both manufacturers and international hunting organisations in the task."

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ISRAEL

DR. SIMON C. NEMTZOV, WILDLIFE ECOLOGIST AND CITES DELEGATE, ISRAEL NATURE AND PARKS AUTHORITY:

"Israel is greatly involved in issues of wildlife conservation, especially where it concerns migratory birds. Israel has also recently agreed to sign the AEWA. Because of Israel's unique position on the major flyway between Eurasia and Africa, many millions of birds pass through the country twice annually. Israel also is greatly involved in projects for raptor conservation. For these reasons Israel is interested in reducing lead use in general, and in hunting ammunition in particular.

The issue of lead poisoning is not a major wildlife conservation priority, but has recently gained momentum as a number of raptors have died from lead poisoning over the last couple of years. Some of these have been shot outside of Israel and died here during migration, others have ingested lead pellets (presumably from hunted carcasses). This issue was brought to light in a number of papers by Israelis, presented at last year's raptor conference in Spain. There is little waterfowl hunting in Israel but lead ammunition is problematic in other uses.

Because hunting is not a major sport in this country there is little pressure to change hunting laws or practices. The hunters are not familiar at all with the issue of non-toxic ammunition and are generally wary of making any changes. No information on the issue is of non-toxic ammunition is available yet in the native languages (Hebrew and Arabic).

At this stage, we are in the process of changing the ammunition used by our rangers to non-toxic shot. There is an action plan being formulated to get hunters to convert to non-toxic shot too, but this has yet to be finalized and implemented. Non-toxic ammunition is not available yet in this country and the ammunition importers have yet to learn about the products available and the most appropriate ones to import and put on sale. Current legislation actually states that hunters MUST use lead shot; this was originally intended to exclude the use of bullets from rifles, but the wording now hampers the introduction of alternative shot. Obviously this has to be amended.

I am not aware of the situation in other countries in the Middle East, but I do know that Israel is the most conservation-oriented nation in the area. Israel will continue to set a positive example for proper nature conservation in the region."

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LATVIA

ANTRA STÎPNIECE, INSTITUTE OF BIOLOGY, UNIVERSITY OF LATVIA:

"In Latvia, we have good legislation concerning the use of toxic shot: it is not allowed at Ramsar sites and nature reserves. Also, the impact of lead shot deposition is alleviated by the fact that many of the main wetlands have bottoms that consist of soft sediments. Shot pellets easily sink into the sediment where they are out of the reach of waterbirds. However, the problem may be larger than we think, because many birds die unnoticed. There is still a need of research to show that this actually is a problem. Otherwise, hunters are not going to take the issue seriously.

Non-toxic shot is available in Latvia, although sometimes it is difficult to obtain the right pellet size. There hasn't been any research to monitor the use of non-toxic shot. I have no statistical data on this, but when I speak to hunters I get the impression that the awareness of the issue is gradually increasing."

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"WITHOUT ANY QUESTION LEAD AMMUNITION IS A SERIOUS THREAT TO SPECIES AND HABITATS WORLDWIDE" BERT LENTEN

IN CONCLUSION

BERT LENTEN, EXECUTIVE SECRETARY OF THE AGREEMENT ON THE CONSERVATION OF AFRICAN EURASIAN MIGRATORY WATERBIRDS, BONN, GERMANY:

"The issue of lead poisoning in waterbirds through the ingestion of spent lead shot is gradually receiving more attention in the international hunting and conservation context. AEWA is very pleased with this development, because without question, lead ammunition is a serious threat to species and habitats worldwide.

During the last years, it has become clear that there are various types of non-toxic ammunition that are high-quality alternatives to lead shot, which makes the solution to the issue obvious: lead shot should not be used any more for hunting waterbirds.

AEWA realises that the implementation of a ban on lead shot worldwide entails many difficulties, particularly of a logistical nature. Firstly there is the awareness issue: hunters need to be convinced of the need of switching to non-toxic shot, and they need to abandon their prejudices about non-toxic shot. Often, the negative image of, for example, having to buy new guns, is totally inaccurate. Learning the facts about non-toxic shot, and about safe and appropriate ways of using it, is an important key in this.

Still, there is a clear need of financial assistance for governments, hunting federations and individual hunters in countries who are not in a position to make any changes in the near future. After all, projects like education and training sessions, change of legislation, and establishment of effective enforcement do cost money. It is therefore necessary that the international community, in the form of conservation organisations, agreement secretariats, international hunting federations and certainly also ammunition manufacturers, should take a firm stand together.

We have to keep in mind that all the difficulties that possibly arise, such as a lack of awareness, time, expertise and finances, may easily lead to a state of bureaucracy, and possibly even pessimism regarding the possibility to solve the issue in a way that all stakeholders are satisfied with. AEWA however believes that it is not only absolutely necessary, but also highly possible to tackle the issue, with the help and energy of all parties concerned.

After all, it is in everybody's best interest to preserve waterbirds and their habitats for the future."

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USEFUL LITERATURE

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Scheuhammer, A.M. and Norris, S.L. 1995. A review of the environmental impacts of lead shotshell ammunition and lead fishing weights in Canada. Canadian Wildlife Service Occasional Paper No. 88. Ottawa, Canada. Available at http://www.cws-scf.ec.gc.ca/pub/ops/op88/home.html.

USEFUL INTERNET SITES

General information on lead poisoning:
Canadian Wildlife Service Site: http://www.cws-scf.ec.gc.ca/hww-fap/lead/leadp.html
Comprehensive French site: http://www.univers-nature.com/dossiers/plomb/
Good overview of the issue and its implications: http://www.swansociety.org/issues/lead/0102lead.html

Ammunition:
Browning: http://www.browningint.com
Remington: http://www.remington.com/AMMO/PAGES/Shotshell/steelselect.htm
General site with useful tips: http://www.ballisticproducts.com/MFGRS/mfglisting.htm

Organisations:
AEWA: http://www.unep-wcmc.org/AEWA/index2.html
Wetlands International: http://www.wetlands.org
FACE: http://www.face-europe.org
IUCN: http://www.iucn.org
Wildfowl and Wetlands Trust: http://www.wwt.org.uk

COLOFON

The African-Eurasian Waterbird Agreement is an Agreement (AEWA) under the Convention on the Conservation of Migratory Species of Wild Animals Commonly referred to as the Bonn Convention. AEWA aims to create a legal basis for a concerted conservation and management policy by Range States for migratory Waterbird Species. The UNEP/ AEWA Secretariat tries to publish twice a year regular issues of the AEWA Newsletter, which provides the latest news on AEWA. This Newsletter is a special issue fully focussing on the problems and possible solutions regarding the use of lead shot for hunting in wetlands.

This Newsletter is also available in French and Russian.

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AGREEMENT AREA

THE AFRICAN-EURASIAN WATERBIRD AGREEMENT (AEWA) WAS OPEN FOR SIGNING AT THE MINISTRY OF FOREIGN AFFAIRS IN THE HAGUE (THE NETHERLANDS) FROM 15 AUGUST 1996 TO 30 SEPTEMBER 1999. BY 31 AUGUST 1999 THE REQUIREMENTS HAD BEEN MET FOR THE AGREEMENT'S ENTRY INTO FORCE. IN ACCORDANCE WITH ARTICLE XIV, PARAGRAPH 1, THE AGREEMENT ENTERED INTO FORCE ON 1 NOVEMBER 1999.
THE AFRICAN-EURASIAN WATERBIRD AGREEMENT, THE LARGEST AGREEMENT DEVELOPED SO FAR UNDER THE CONVENTION OF MIGRATORY SPECIES (CMS), CAME INTO FORCE AN 1 NOVEMBER 1999. SINCE THEN THE NUMBER OF CONTRACTING PARTIES IS GROWING STEADILY.