

International Update Report on Lead Poisoning in Waterbirds

1. Introduction	2
2. Summary	5
3. Conclusions and Recommendations	8
3.1 General situation	8
3.2 Legislation and enforcement.....	8
3.3 Awareness and education.....	8
3.4 Research and development	9
3.5 Implications for development and co-ordination: two examples	10
4. General description of the lead poisoning issue.....	11
4.1 Lead deposition in the environment.....	11
4.2 Lead ingestion by waterbirds	11
4.3 Secondary poisoning	12
5. Solutions to the lead poisoning issue	14
5.1 General options.....	14
5.2 Alternatives to lead shot.....	14
5.2.1 Cost	14
5.2.2 Availability.....	15
5.2.3 Impact on guns	15
5.2.4 Safety	15
5.2.5 Ballistics.....	15
5.2.6 Different skill requirements.....	16
6. Conventions and agreements addressing the lead poisoning issue: Current situation and developments	17
6.1 The Ramsar Convention	17
6.2 The Bonn Convention (CMS).....	17
6.3 AEWA.....	18
6.4 The Bern Convention	19
6.5 The Birds and Habitat Directives	19
6.6 The Asia-Pacific Migratory Waterbird Conservation Strategy	19
6.7 The Declaration on Risk Reduction for Lead	20
7. International Hunters' Organisations: Current view on the lead poisoning issue.....	21
7.1 FACE.....	21
7.2 CIC	21
8. Current situation and developments in individual countries	22
9. Discussion	29
10. Acknowledgements	30
11. References	31
11.1 Literature.....	31
11.2 Internet sites and Personal Communications	33
Appendix I: Questionnaire which was sent to individual countries.....	35
Appendix II: Overview of the response of individual countries.....	38
Appendix III: Statements of individual countries in alphabetical order.....	42
Appendix IV: Contact addresses	73
Appendix V: List of useful Internet sites	76

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1. Introduction

Lead poisoning in waterbirds through ingestion of spent lead pellets often remains unnoticed. The issue is of common concern to many interest groups, including local, national and international decision-makers, conservationists, members of the hunting and sport fishing communities, and arms and ammunition manufacturers. However, in many countries lead poisoning is not recognised as a problem, and environmental dangers have yet to be acknowledged. Lead poisoning is a common mortality factor in many wetland areas, resulting from years of lead deposition through intense shooting with shotguns, and to a lesser extent from fishing with lead sinkers. Waterbirds, particularly Anatidae, are at great risk of poisoning, due to their habit of selectively picking up particulate matter from the sediment. Millions of waterbirds are estimated to die of lead poisoning each year.

During the 1980's and 1990's several international organisations and many national governments started to try to change this situation. 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 United States were the first nation to ban the use of lead shot for waterbird hunting, in 1991. In that same year, the IWRB (International Waterfowl and Wetlands Research Bureau, now Wetlands International) convened an international workshop to assess the scale of lead poisoning in waterbirds, and to identify possible solutions to this problem. A series of recommendations emerged, and the full proceedings were published in 1992. These recommendations were used in formulating statements in a number of international Conventions and Agreements, one of which (AEWA, the African Eurasian Migratory Waterbird Agreement) urges its member states to phase out the use of lead shot entirely. In 1995 and in 1997, Wetlands International produced International Update Reports on Lead Poisoning in Waterbirds. Their aim was to identify new developments in this field and to report on progress since the 1992 publication. The information was collected through questionnaires which were sent to national governments and to interested (inter)national organisations and agencies. The current Update Report continues this course by reviewing developments since 1997.

The 1995 and 1997 International Update Reports primarily focused on European countries, and to a lesser extent on other countries within the geographical coverage of the AEWA, and some others, e.g. Canada, the USA and Japan. For the present report, a much larger selection of countries was queried, particularly contracting countries to the Convention on Migratory Species (CMS, or Bonn Convention), also outside the AEWA region. However, the focus remained on the earlier selection as far as the section on relevant Conventions and Agreements is concerned; no research was done on relevant Conventions and Agreements in other areas of the world.

In this study a total of 137 countries and 11 organisations were queried, of which 74 and 9 responded, respectively. A 75th, the Bulgarian reaction, arrived just before the production of the report in August 2001, so it could not be included any more in the analysis. It has been incorporated in Appendix III.

Through detailed "yes/no 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. The original questionnaire can be found in Appendix I.

In addition, the present report contains a section with background information on lead poisoning in waterbirds through ingestion of lead pellets, meant to enhance understanding and appreciation of all aspects of the issue, and to provide authorities, non-governmental organisations and hunters' organisations with some ideas and tools helpful for minimising lead poisoning in waterbirds.

In short, this report aims to provide an answer to the following questions:

- What is the nature and the scale of the lead poisoning problem, and which are the possible solutions?
- What is the current situation, and which are the developments since the 1995 and 1997 reports, concerning international conventions and agreements addressing the lead poisoning issue?
- What is the international hunting community's view on the issue?
- What is the current situation concerning legislation, awareness, research, and co-ordination in individual countries, and which are the developments since the previous two reports?
- Which appear to be the main obstacles in the development of the aspects mentioned above?

Wetlands International sincerely hopes that this report will function in maintaining a clear focus on the issue among a wide international target audience, and above all will advance progress and wise decision-making in tackling lead poisoning in waterbirds. In addition, it is hoped that the list of contact persons will enhance communication and exchange of experience between different countries. Readers are encouraged to copy and distribute this report to other relevant and interested parties.

2. Summary

This report reviews the world-wide issue of lead poisoning in waterbirds through the ingestion of spent lead shot pellets. Firstly, it describes the background to the issue, its scale, biological consequences, possible solutions and the advantages and disadvantages of non-toxic shot. Secondly, it reviews the major international conventions and agreements addressing the lead poisoning issue and the developments which have been made internationally. In addition, this report discusses two international hunters' organisations' views on the issue and the recent developments. The main part of the report, however, focuses on the current situation and developments in individual countries. Main obstructions to phasing out the use of lead shot are summarised, followed by a set of recommendations for governments, NGO's, convention secretariats, hunters' organisations and individual hunters. The compilation is based on questionnaire returns and additional information contributed by contacts from 74 nations and 9 organisations. Appendices include the questionnaire, a complete overview of national contributions, and relevant additional information.

Chapter 4: General description of the lead poisoning issue

The vast majority of lead poisoning in birds results from the ingestion of lead gunshot, with a considerable additional mortality from lead fishing weights. The problem of lead poisoning in waterbirds through the ingestion of lead shot pellets was recognised as early as the late 1800's and has now been recorded in at least 21 countries.

Many tonnes of lead are deposited annually in wetlands all over the world. Lead shot pellets build up in the sediments of lakes and marshes where they are accessible to waterbirds. Lead pellets are mistaken for food items or grit, which is retained in a waterbird's gizzard to facilitate the mechanical breakdown of food. It is this gizzard action and acidity which make waterbirds vulnerable to lead poisoning. Millions of waterbirds die annually because of this, either acutely in large-scale die-offs, or through less conspicuous, day-to-day mortality which is caused indirectly by sublethal poisoning (general weakness, impaired behaviour, reduced reproduction). As little as one pellet can cause chronic lead poisoning, whereas ten pellets are enough to kill a bird rapidly. An additional, large-scale environmental problem is secondary lead poisoning of raptors and other predators, which accumulate lead by consuming waterbirds with ingested lead shot in their gizzards.

Chapter 5: Solutions to the lead poisoning issue

The obvious long-term solution for the lead poisoning issue is switching from lead to non-toxic alternatives, either through voluntary or statutory measures. There are high-quality, non-toxic alternatives to lead, for example steel shot, which is most widely available and least costly. Steel shot is in many countries slightly more expensive than lead shot, although prices are currently decreasing with increasing demand. Steel shot is not available in all countries. A commonly raised complaint is that steel shot damages guns; however, it has been shown that the most commonly used guns are not significantly damaged by the use of steel shot. Only lighter and older guns may experience minor damage. Although this damage is mainly cosmetic, it should (and can) be avoided by appropriate information campaigns for hunters. Steel shot does have a few safety risks, which become insignificant with familiarity and practice: the use of steel shot entails an increased risk of ricochet (rebound; of minor importance in wetlands), and barrel pressures are higher. The majority of currently used guns are proofed for pressures amply suitable for the use of steel shot. Steel shot has ballistic properties which differ from those of lead shot; however, when shooting from reasonable distances (generally accepted regardless of shot type) and after some practice with shooting with steel shot, crippling rates are no higher than when using lead shot. On the contrary, the hardness of steel shot ensures deeper penetration when hitting the target.

Chapter 6: Conventions and agreements addressing the lead poisoning issue: current situation and developments

The Convention on Wetlands of International Importance (also known as the Ramsar Convention) does not specifically address the lead poisoning issue, but urges its contracting parties to conserve wetlands and use them sustainably, among other things by recognising the harmful impact of toxics, and by encouraging a hunting ethic which aims to prevent wasteful losses of waterfowl and to promote wise and sustainable hunting practices.

The Convention on the Conservation of Migratory Species of Wild Animals (CMS, also known as the Bonn Convention), developed under the United Nations Environmental Programme (UNEP), does not specifically address the lead poisoning issue; however, one of the convention's agreements, the African Eurasian Migratory Waterbird Agreement (AEWA), states that parties shall endeavour to phase out the use of lead shot for hunting by the year 2000. In one of the AEWA's Resolutions, the Meeting of Parties acknowledges the technical difficulties that some Range States have in phasing out lead shot. In the light of this Resolution, the AEWA Secretariat will, together with the Federation of Associations for Hunting and Conservation of the EU (FACE), organise a workshop on the use of non-toxic shot in Romania in October 2001.

One of the conventions established by the Council of Europe is the Convention on the Conservation of European Wildlife and Natural Habitats, also known as the Bern Convention. One recommendation under this convention concerns the use of non-toxic shot in wetlands. A European Action Plan was adopted to address lead poisoning in the Marbled Teal (*Marmaronetta angustirostris*).

The European Commission has discussed the issue in the framework of its Birds Directive. The Commission recommends that each of the European Union's member states takes its own measures. The Asia-Pacific Migratory Waterbird Conservation Strategy, an international co-operative initiative, has core financial support from the governments of Japan and Australia and is co-ordinated by Wetlands International. Within this framework, projects are set up relating to migratory waterbird and wetland habitat conservation efforts in the Asia-Pacific flyways. The lead poisoning issue is currently not being discussed within the Strategy, since protecting habitats and getting legal protection for endangered species are considered to be higher priorities at the moment. However, the Wetlands International Office in Japan has held a national workshop on this subject.

The Organisation for Economic Co-operation and Development (OECD) has adopted a "Declaration on Risk Reduction in Lead", in which it encourages its member states to restrict the use of lead shot in wetlands and promote the use of alternatives to lead fishing weights in shallow waters. The OECD, as part of its Risk Management, issued a status report on lead in 1999, which reported that a small number of OECD countries have made considerable progress concerning their legislation on the use of non-toxic shot and fishing weights.

Chapter 7: International Hunters' Organisations: current view on the lead poisoning issue

The policy of the Federation of Associations for Hunting and Conservation of the EU (FACE) is aligned to the principle of wise use. FACE believes that legislation concerning the use of non-toxic shot should be established according to a realistic, not arbitrary, timescale, which it indicates as currently (i.e. under AEWA) insufficient. FACE emphasises the need for more information and education, especially concerning technical, ballistic and safety aspects, and for more development concerning the availability and cost of non-toxic shot, and gun proofing facilities.

The Migratory Bird Commission of the International Hunting Council (CIC) issued a resolution on the use of non-toxic shot in 1992. CIC will financially support the workshop on non-toxic shot, organised by FACE and the AEWA Secretariat, which will take place in Romania in 2001.

Chapter 8: Current situation and developments in individual countries

Lead shot is being used in more than three-quarters of all countries which responded to the questionnaire. Less than half of all countries have voluntary or statutory regulations concerning the use of non-toxic shot. The percentage of countries with such regulations has shown a steady increase since 1995. More than one third of all countries made progress between 1995 and 2000. Countries which ratified the Bonn or Bern conventions or AEWA did not show significantly more progress than countries which did not ratify the respective conventions. However, a higher percentage of AEWA countries than of non-AEWA countries currently has legislation concerning the use of non-toxic shot, which is not true for the other conventions.

The majority of responding countries report the estimated amount of lead present in wetlands to be medium. Approximately one third of countries which have legislation do not monitor the use of non-toxic shot; the same thing is true for the enforcement of legislation. Countries which already have legislation, engage more in the development of new legislation than countries which do not have any legislation.

There is an awareness of the problem in approximately two thirds of all responding countries. However, the percentage of countries which have had media/education campaigns or which have information materials available, is much lower. More countries engage in research than in education.

Many explanations were given for the difficulties in addressing the issue of lead poisoning. They mainly had a financial, logistical or political/bureaucratic nature. Lack of awareness was also given as a reason, as was lack of communication between hunters and authorities.

Chapter 9: Discussion

The nature of this survey (namely, based on filled-in questionnaires) entails a certain subjectivity which reduces possibilities for analysis of data and interpretation of results. However, this remains the most feasible way of collecting data world-wide and on a wide range of aspects of the problem.

3. Conclusions and Recommendations

3.1 General situation

Lead poisoning in waterbirds through the ingestion of lead shot pellets is a very serious and large-scale environmental problem which affects wetlands and their species world-wide. Phasing out the use of lead shot is now widely recognised as the only long-term solution to this problem.

It appears that the problem is approached most effectively when awareness raising campaigns, education and training of hunters, and an enhanced availability of non-toxic shot precede legislation, rather than the other way around.

3.2 Legislation and enforcement

Considerable progress has been made since 1995 concerning legislation against the use of lead shot for hunting waterbirds. Nevertheless, there are still many countries in which this issue is not legally (or voluntarily) addressed. Although several major international conventions and agreements address the issue of lead poisoning in waterbirds, either indirectly or specifically, many of the contracting parties are far from complying with the intentions of the Conventions and Agreements they ratified.

- *All countries which have not yet signed the relevant international biodiversity conventions/agreements (specifically Bonn & AEWA, and Ramsar) should be encouraged to do so. The international community of countries which did sign these conventions/agreements (governments, NGO's, convention/agreement secretariats) should assist with this process, by making information, expertise, logistics and finances available to countries which have shown a need of those.*
- *Countries which did sign agreements and conventions should be held more responsible for their actions regarding the issues addressed by the convention and agreement texts. Countries which do not comply with the conventions they have signed and ratified should be urged to do so.*

Even if a country has legislation concerning the use of lead shot, it appears that this is not the only factor which decides to what extent the issue is actually being addressed. A strikingly high percentage of countries with legislation has no effective enforcement and reports that illegal hunting does take place. It appears that logistics and finances are often the limiting factor in this issue.

- *Legislation is not powerful without effective enforcement. Therefore, governments should consider law enforcement as an important part of the solution to the lead poisoning issue. More logistics and finances should be allocated to this end.*

Countries which have legislation concerning the use of lead shot are putting more effort into the developments of new legislation than countries without any regulations.

- *Countries which already have legislation concerning the use of lead shot should assist countries without legislation in addressing the issue legally, since expertise (legal, organisational, political) could be an important factor which drives the development of legislation. Conservation NGO's and convention secretariats should be an intermediate factor in this process.*

3.3 Awareness and education

The awareness of the lead poisoning problem remains extremely low.

- *Conservation NGO's and convention secretariats should put more effort into the awareness raising aspect of the problem. Firstly, authorities need to be alerted, which in turn should take responsibility by using their power, finances and logistics to support awareness campaigns, and by adjusting their legislation accordingly.*

An important link between awareness raising and an actual improvement of the situation appears to be education of hunters. A highly non-productive situation is reached when hunters structurally disagree with the way authorities want to solve the problem. Mutual lack of understanding and communication, and lack of education for hunters, are the basis of the majority of these disagreements, and limit hunters' willingness **and** ability to successfully switch to non-toxic shot.

- *Conservation NGO's and convention secretariats should continue to stimulate/facilitate communication between authorities and hunters. Legislation should not be developed without consulting with researchers and hunters' organisations about the feasibility and implications of legal measures.*
- *Conservation NGO's and convention secretariats should give high priority to information and education campaigns for hunters. These should consist of both theoretical education (e.g. why is this a serious environmental problem and how does this ultimately affect hunting itself; what has been and can be done about it; which role can hunters play in solving the problem; what are the cost/safety/technical aspects of switching to non-toxic shot) and practical workshops. Information materials should be made widely available.*
Countries which have experience with these kind of workshops and education campaigns and/or which have finances/logistics available for this, should help countries which have shown a need for them. Conservation NGO's together with convention secretariats could co-ordinate such projects, supported by national governments, and in co-operation with (international) hunters' organisations, following the example of the AEWA-FACE-CIC workshop in Romania in 2001 and the various projects initiated by CONSEP in the United States (see the examples below). The development of co-ordinated education programmes like CONSEP would be an important step forward.
- *Hunters' organisations as well as individual hunters should make an effort to actively acquire information about the lead poisoning problem and about the advantages of non-toxic shot, and to acquire the skills necessary in order to strive for wise and sustainable hunting.*
- *Each country should have gun proofing facilities. International hunters' organisations and Convention/Agreement secretariats should stimulate the national governments to provide these.*

3.4 Research and development

Countries engage more in research than, for example, in awareness raising activities or the publication of information materials. Relatively much research is focused on the toxicity aspects of the lead poisoning issue. However, research has indicated beyond any doubt that lead pellets are ingested by waterbirds and that this causes serious, large-scale environmental problems. There appears to be a higher need for inventories of the scale of the problem, and for information on the relative importance of factors (e.g. awareness, legislation, finances) regarding the lead poisoning issue.

- *Time, finances and logistics available for research should preferably not be allocated to more detailed research concerning the exact degree and background of the toxicity of ingested lead pellets. Rather, research should be focused on determining the incidence of lead poisoning in those countries where the scale of the problem is unknown. Awareness of the scale of the problem can, in turn, lead to constructive developments.*
- *In line with the data presented in the current report, conservation NGO's and convention secretariats should do additional research in order to determine more precisely which factors seem to be most important in tackling the lead poisoning issue. Such research could be used to inform governments on the relative importance and order of measures to be taken.*

The low availability and the relatively high cost of non-toxic shot form an important factor which impedes both the development of legislation and the actual switch to non-toxic shot. This is very unfortunate, because it discourages the use of non-toxic shot.

- *Authorities should make an effort to initiate and facilitate the production of non-toxic shot. This could be done by encouraging and supporting lead shot manufacturers when they switch to producing non-toxic shot, both financially (through tax relief or other subsidies) and logistically (e.g. through the establishment of co-operation with countries which have experience in this field).*

- *Steel shot manufacturers and other businesses in well-developed (e.g. OECD) countries should be encouraged to invest in the steel shot industry in developing countries and other countries which are financially unable to do so themselves. Once more widely accepted, it is expected that the increasing demand for steel shot will give this industry high potential.*

3.5 Implications for development and co-ordination: two examples

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 Shotgun Education Program (CONSEP). CONSEP is sponsored by some of the major ammunition manufacturers such as Remington and Winchester, and by the U.S. Fish and Wildlife Service, various state wildlife agencies, the Australian Department of Conservation and Education, and the Canadian Wildlife Service. The objectives of this programme 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 are a progressive initiative indispensable to solving the issue concerned, and should serve as a valuable, constructive example for other governments and agencies to educate and train their hunters (CONSEP 1992, Mondain-Monval 1999).

One of the projects mentioned in the Action Plan of the African Eurasian Migratory Waterbird Agreement (AEWA) is the Review of the use of non-toxic shot for waterbird hunting (i.e. the present report). Besides this review, workshops are also foreseen to provide important guidance for decision-makers and hunters' organisations on how to solve this problem. The Agreement Secretariat, in close co-operation with the Federation of Associations for Hunting and Conservation of the EU (FACE), and with financial support from the International Hunting Council (CIC) and Switzerland, has taken the lead to organise a workshop on the use of non-toxic shot, which will take place in Romania in October 2001. Its target group will be representatives of hunters' organisations in Eastern Europe, and its goal will be to raise awareness of the impact of lead poisoning of waterbirds and to make this user group familiar with substitutes for lead shot. During practical instruction sessions, hunters will be able to practice shooting with non-toxic alternatives (AEWA, *pers. comm.*, CIC, *pers. comm.*).

4. General description of the lead poisoning issue

4.1 Lead deposition in the environment

Lead shot ingestion has been reported in waterbirds since the late 1800's (e.g. *Grinell 1894, Bellrose 1959, Scheuhammer & Norris 1995*). Lead is a toxic substance and is, in the form of lead shot, estimated to kill many millions of waterbirds each year (e.g. 250,000 in Canada, *Scheuhammer & Norris 1995*; 1.5-4 million in the US, *Bellrose 1959*) and chronically poison millions more, both of which are in addition to the numbers of waterbirds intentionally killed by hunters. Lead poisoning in waterbirds from ingestion of lead shot has been reported in many countries. Research concluded that high lead exposure in waterfowl and their predators is consistent with lead shot ingestion, and not with exposure to other forms of lead in the environment (*USFWS 1976, Scheuhammer & Norris 1995, CWS 2001*).

Lead shot can be deposited in wetland environments through clay-target shooting; however, the vast majority (70-80%, *Scheuhammer & Norris 1995*) of lead deposition results from the hunting of birds in and around wetland areas. Shotgun shells used for hunting ducks and geese each contain about 280 lead pellets, weighing about 35 grams in all. A hunter fires an average of six shells for every bird which is hit (*USFWS 1986*). 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 (e.g. Canada: 2000 tonnes per year, *Scheuhammer & Norris 1995*; Australia: 350 tonnes per year; *NRE, pers. comm.*; Ukraine: at least 700 tonnes per year, *WIBSP, pers. comm.*). Lead shot builds up in the bottom sediments of hunted marshes and lakes. In Canada, pellet densities of 9,000-180,000 per hectare have been recorded in many areas, and in some heavily hunted lakes this number even reached two million per hectare (one hectare equals approximately two and a half acres), which corresponds with 200 pellets per square meter or 22 pellets per square foot. Pellet densities in hunted marshes in Canada are comparable to those in other countries (*Scheuhammer & Norris 1995, Mateo et al. 1998*).

Fishing sinkers and jigs (weighted hooks) can also be ingested by waterbirds. The US Fish and Wildlife Service (1999) reports that lead poisoning from ingested sinkers and jigs accounts for 10-50% of the mortality of Common Loons (*Gavia immer*); a study revealed that 27% of adult loons had fishing tackle in their stomachs and high lead levels in their blood. Swans, cranes, and other waterbirds have also been reported to die from lead poisoning after swallowing lead fishing sinkers and jigs (*Birkhead 1982, Ensor et al. 1992, Pokras et al. 1992, USEPA 1994, USFWS 1999*). In Canada, several hundreds of tonnes of lead from lost sinkers and jigs end up in the environment; this accounts for ca. 20% of the annual lead deposition (*Scheuhammer & Norris 1995*).

4.2 Lead ingestion by waterbirds

It has often been assumed that lead from spent shot and lost fishing sinkers is environmentally stable or inert and thus not a considerable source of environmental lead contamination and transfer. However, there is now sufficient evidence to conclude that ultimately all of the metallic lead in shot and sinkers will be transformed into particulate and molecular kinds of lead and will be dispersed through the environment to some degree. This process can result in local lead concentrations in soils and water far in excess of normal concentrations, which can form a serious risk factor for all trophic levels: lead transferred to soil and sediment invertebrates and terrestrial and aquatic plants will ultimately affect entire food webs (*Jorgensen & Willems 1987, Scheuhammer & Norris 1995*).

Tens or hundreds of years may be required for total breakdown and dissolution of lead pellets (*Scheuhammer & Norris 1995*). In addition, wetland bottoms are often too compact for pellets to sink into the sediment. Therefore, the vast majority of spent lead remains accessible for waterbirds (*CWS 2001*).

Lead shot ingestion and poisoning of waterfowl has now been documented in at least 21 countries, including Canada (*Kennedy & Nadeau 1993*), Australia (*Kingsford et al. 1989*), Great Britain (*Mudge 1983*), France (*Pain 1990, Beck & Granval 1997*), Spain (*Mateo et al. 1998*), The Netherlands (*Lumeij & Scholten 1989*), Japan (*Honda et al. 1990; Ochiai et al. 1993*), and the United States (*Sanderson & Bellrose 1986; USFWS 1986*). It has been known since the late 1800's (*Grinell 1894*) that waterbirds ingest spent lead shotgun pellets that have been deposited on the bottoms of lakes

and marshes, mistaking these pellets for food items or grit, which is selectively picked up from the bottom in order to facilitate the grinding of food in the gizzard. Once lead pellets are ingested, ionic lead is released as a result of the grinding action of the gizzard combined with the acidic environment of the digestive tract. If there has been ingestion of a large number (ten or more) of shot, **acute lead poisoning** rapidly ensues, and birds usually die within a few days. Because sinkers are generally much larger than shot pellets, a single lead sinker may induce acute poisoning. Victims of acute poisoning can appear to be in good condition, without pronounced weight loss. More commonly, birds die of **chronic lead poisoning** following ingestion of a smaller number (two to ten) of shot pellets. In these instances, signs of lead poisoning (green and watery faeces, drooping wings, anaemia, weight loss, atypical behaviour) appear more gradually, and affected birds die approximately two to three weeks after ingesting the shot, often in a very weak condition. In addition, many sublethally exposed birds probably die, even though mortality cannot be attributed directly to lead poisoning. Lead exerts sublethal toxic effects on many tissues, primarily the central and peripheral nervous systems, the kidneys, and the circulatory systems. The lesions caused in these tissues by lead exposure result in biochemical, physiological, and behavioural impairments. These impairments contribute to an increased risk of starvation, predation, and disease in affected birds; in addition, reproduction can be impaired or even obstructed (*Demayo et al. 1982, Scheuhammer 1987, Eisler 1988, Scheuhammer & Norris 1995, Duranel 1999, Mézières 1999, VHJ 2000*).

Mortality of waterfowl from lead shot ingestion becomes manifest either as large-scale die-offs or as less conspicuous, day-to-day mortality. Many instances of die-offs have been recorded in the United States (*USFWS 1986*) and Canada (*Kennedy & Nadeau 1993*). Although spectacular cases of mortality have drawn public attention to the issue of lead poisoning, these occasions are probably less important than the largely invisible losses of small numbers of birds on a daily basis. Sick and dying birds generally become increasingly reclusive. After death, carcasses are not likely to be seen, even by trained observers (*Stutzenbaker et al. 1986*). Carcasses are not often noticed unless the mortality rate surpasses the ability of predators and scavengers to efficiently remove them. Because of the difficulties of directly measuring the day-to-day mortality of waterfowl from lead poisoning, various indicators of lead exposure have been developed and used as indirect measures of the relative magnitude of lead shot exposure and poisoning (*Scheuhammer & Norris 1995*). The most widely used method has been the gizzard survey, which estimates the incidence of shot ingestion at local sites at the time of sampling. Based on gizzard surveys, it has been estimated that a total of about 15% of all dabbling ducks in Canada could be ingesting at least one shot pellet every year (*Scheuhammer & Norris 1995*). Similar considerations caused Sanderson and Bellrose (1986) to estimate that as many as 40% of North American waterfowl ingest shot during a single season of exposure. Several other studies have demonstrated that the incidence of embedded shot in apparently healthy, free-flying waterfowl frequently exceeds 20%, indicating that millions of migrating ducks and geese carry embedded shot (*Scheuhammer & Norris 1995*).

These are rough estimates of average ingestion incidence; statistics could vary considerably among different geographical locations, and among different species. In addition, these estimates are valid only for a period of about 20 days prior to sampling, because shot are either completely eroded or have passed through the digestive tract within that time (*Dieter & Finley 1978*). More reliable therefore are bone lead surveys; bone lead concentration is a good indicator of the relative degree of lifetime lead exposure because lead has a high affinity for mineralised tissue and easily accumulates in bone. Once deposited there, lead has an extremely long biological half-life. A duck that has ingested one or more lead pellets should, assuming it survives, exhibit an elevated bone lead level for the rest of its life (*Scheuhammer & Norris 1995*).

4.3 Secondary poisoning

Lead poisoning by ingestion of lead pellets from the environment is referred to as primary poisoning. Secondary lead shot poisoning can occur when a predator or scavenger consumes animals that have been shot with lead shotshell ammunition and consequently carry lead shot pellets embedded in their bodies, or consumes the gizzard of a bird that has ingested lead shot. It was previously thought that this form of lead poisoning was a rare occurrence and probably did not constitute a significant wildlife management problem. However, research done in various countries over the past 5–10 years has demonstrated that secondary poisoning, particularly of raptors such as Bald Eagles (*Haliaeetus leucocephalus*), is a significant source of mortality in many places. In the United States and in Canada, for example, secondary lead poisoning accounts for 10-15% of the recorded post-fledging Bald Eagle mortality (*USFWS 1986, Wayland & Bollinger 1999*). Similar facts have now been documented in

many locations in Europe and North America in various other raptor species as well, including Golden Eagles (*Aquila chrysaetos*), Northern Goshawks (*Accipiter gentilis*), Peregrine Falcons (*Falco peregrinus*), White-tailed Eagles (*Haliaeetus albicilla*) and European Sparrowhawks (*Accipiter nisus*) (USFWS 1986; Pain & Amiard-Triquet 1993; Pain et al. 1993, 1994; Kenntner et al. 2001). Many free-living raptor species for which secondary poisoning has not yet been documented nevertheless risk this type of poisoning as a direct consequence of their preferred feeding habits. Also, sublethal lead exposure contributes to mortality from other causes (Scheuhammer & Norris 1995).

Lead poisoning in waterbirds can also form a considerable health risk to humans. Consumption of game killed with lead shot can result in lead exposure and intoxication. This can happen either through ingestion of tissues from lead-exposed or lead-poisoned animals that have biologically accumulated higher than normal concentrations of lead, or through ingestion of tissues containing fragments of metallic lead or lead shot pellets themselves (Scheuhammer & Norris 1995). Lead concentrations in muscle tissue of wildfowl are generally considered harmless to human health when not exceeding 0.5 mg/kg. CWS scientists observed that 15% of 227 breast muscle samples from waterfowl killed with lead shot contained lead at concentrations higher than 0.5 mg/kg. Lead concentrations in these muscle samples ranged as high as 759 mg/kg (CWS, unpubl. data, in Scheuhammer & Norris 1995). Increased lead exposure and intoxication in humans can also occur as a result from retention of lead shot pellets, most often in the appendix. In Canada, one study reported that 62 patients seen in a Newfoundland hospital had from 1 to over 200 retained lead shot in their appendices (Reddy 1985). Signs of serious lead intoxication include paralysis of the hands, anaemia, wasting of the upper chest muscles, weakness in limbs, and neurological signs (Hillman 1967).

5. Solutions to the lead poisoning issue

5.1 General options

Three general options have been considered as potential solutions to the issue of lead shot poisoning of waterbirds and their predators (*Sanderson & Bellrose 1986; Mudge 1992*): 1) manipulation of the habitat to reduce the availability and/or toxicity of spent shot; 2) coating, plating, or otherwise altering lead shot pellets to reduce toxicity; and 3) regulations prohibiting the use of lead shot, combined with the use of alternative, non-toxic shot.

Manipulation of waterfowl habitat to reduce the availability of the spent shot includes lowering water levels in feeding grounds after the hunting season so that waterfowl will leave the area or raising the water level so that spent shot pellets will be out of reach of the waterfowl, and ploughing of dry areas to cover up lead shot. However, these actions are expensive, labour-intensive, of questionable effectiveness, and inappropriate since they deal with the symptoms of the lead shot issue, and not with its sources. In addition, these measures disturb the natural balance in ecosystems, which is especially undesirable in vulnerable and protected natural areas. Habitat manipulation is thus not an effective option.

In an attempt to retain the ballistic qualities of lead but to reduce its toxicity to waterfowl, lead shot was coated with other metals or non-metallic materials such as plastic (*USFWS 1986*). Ingestion of shot coated with tin, nickel, or plastic resulted in similar toxicity to that observed with pure lead shot, as these coatings were removed by the grinding action and acidity of waterbird gizzards. Other attempts were made to reduce the toxicity of lead shot by combining it with a biochemical chelating agent (EDTA) or a water-soluble binder (phosphate) to reduce the uptake of lead following ingestion. However, mortality after ingestion of these modified shot types was equal to or greater than that obtained with pure lead shot. Clearly, none of these techniques represent a general, effective solution to the problems associated with the use of lead shot.

Development of non-toxic alternative shot products is currently taking place in the United States, Canada, and other countries. Regulations prohibiting the use of lead shot, combined with education and practical instructions for hunters concerning the use of functional, affordable, and non-toxic alternatives, are the preferred options for solving the problems associated with lead shot in the long run (*USFWS 1986, Sanderson & Bellrose 1986, Mudge 1992, Scheuhammer & Norris 1995, Mondain-Monval 1999*).

5.2 Alternatives to lead shot

The use of lead shot for hunting or clay target shooting is not essential. There are high-quality, non-toxic alternatives to lead shot, and acceptance of these alternatives among hunters has been increasing over the past several years. World-wide, three major non-lead shotshell products are commercially available: steel (Fe), bismuth (Bi), and tin (Sn). A fourth alternative, zinc (Zn), has been proven toxic. At least three additional alternatives (molybdenum(Mo)/polymer, tungsten(W)/polymer, and tungsten/bismuth/tin alloy) are at various stages of development and testing. A list of manufacturers of currently produced alternative shot products is can be found at various websites (e.g. *CWS 2001, see Appendix V*) (*Scheuhammer & Norris 1995*).

Hunters are often reluctant to switch from lead shot to steel. Arguments used against alternative shot include higher cost, limited availability, increased damage of guns, decreased safety, and inferior ballistics. Many organisations, among which the USFWS (1976), have researched the differences in performance between lead and steel shot. The findings of the USFWS research and other research are summarised below.

5.2.1 Cost

In general, lead shotshells are the least expensive, because of lead's wide availability, low cost, and ease of manufacturing. All alternative products are more expensive, at least initially, but are not prohibitively costly. In addition, high-performance lead cartridges are approximately the same price as some steel loads. It is expected that the demand for steel shot will increase due to legislative developments; as a result, prices should continue to decline (*Scheuhammer & Norris 1995, Env. Can. 2001*).

5.2.2 Availability

Steel shot, currently the major alternative to lead, is available in many countries from large retail chain stores and from smaller retailers, although availability outside of non-toxic shot zones and in countries where hunting is only a small-scale activity, is frequently limited. However, the availability of steel shot is still increasing (*Scheuhammer & Norris 1995*).

5.2.3 Impact on guns

All modern steel shot cartridges enclose the shot in a hard plastic cup, preventing the shot from coming into contact with gun barrels. Major arms and ammunition manufacturers have indicated that currently available steel shot loads cause no significant reduction in the life of the shotguns most commonly used (*USFWS 1986, Coburn 1992, Env. Can. 2001*). Very light field guns, older guns made with soft, thin-walled barrels, Brownings of early serial number, and shotguns with sharp-angled or swedged full chokes may experience some barrel damage if heavy lead and/or steel loads are used (*Roster 1978*). However, the most commonly encountered problem, "ring bulge", is strictly cosmetic and neither poses a threat to safety, nor alters its patterning performance. Still, this damage should (and can) be avoided by appropriate information campaigns directed the hunters (*Coburn 1992, Env. Can. 2001*).

5.2.4 Safety

Safety issues primarily concern steel shot, and not the other non-toxic alternatives, which is unfortunate since steel is generally considered the most attractive alternative to lead because of its ballistics, availability and cost.

Firstly, the use of steel shot entails an increased risk of ricochet (rebound) of pellets because of its hardness. This makes steel less suitable for use in wooded areas, and for shooting towards the (frozen) ground. However, this does not constitute a considerable problem in wetland areas.

Secondly, it has been suggested that steel pellets, compared to the softer lead pellets, induce a more serious risk of dental damage to people consuming wildfowl.

Thirdly, the use of steel shot may result in an increased pressure in chamber and barrel, since steel pellets are in some cases launched at higher velocities than lead in order to compensate for their lighter weight (the alternative being the use of larger pellets). The International Permanent Commission for Firearms Proofing (CIP¹) has therefore developed a series of standard proof pressures and steel cartridge categories; it is recommended that "Standard" steel cartridges are used in guns proofed to 850 kg/cm², and "High Performance" steel cartridges in guns proofed to 1200 kg/cm² and having passed a special "Steel shot Proof". However, the majority of guns currently used and available are proofed to 900-1200 kg/cm², and are thus all suitable for the use of "Standard" steel cartridges. No occasion has ever been reported where a barrel or chamber exploded solely due to steel shot use. To avoid bulging, it is recommended that hunters respect the CIP safety recommendations, that they do not fire steel shot from guns with ¾ or full choke, and that they take the necessary precautions, especially when using older, lighter, or already damaged guns (*Brister 1992, ASJV 1993, VHJ 2000, NARGC 2000*).

5.2.5 Ballistics

One of the most disputed aspects surrounding the phase-out of lead shot for hunting has been the concern that the proportion of game birds injured but not killed by hunters (the crippling rate) would undergo a dramatic increase if only steel shot were used. The ultimate effect might be that increased losses of birds through crippling would surpass the number of birds saved by the elimination of lead poisoning. There is now sufficient evidence to conclude that this is probably not the case (*USFWS 1976, 1986, Morehouse 1992, Scheuhammer & Norris 1995, Mondain-Monval 1999, Env. Can. 2001*).

There is no doubt that the ballistic properties of lead and steel shot differ. Steel shot pellets are about 30% lighter than lead pellets of the same diameter and are significantly harder. These basic physical differences result in less pellet deformation, denser patterning, shorter shot strings, and a lower retained velocity/energy at long ranges for steel shot compared with lead shot. However, the development of modern steel shotshell ammunition has evolved to the point where the perceived

¹ Austria, Belgium, Chile, Czech Republic, Finland, France, Germany, Hungary, Italy, Russia, Slovak Republic, Spain and the United Kingdom are members of the CIP. These countries recognise each other's proofs and measurements.

deficiencies of steel have been largely overcome (*USFWS 1986, Brister 1992, Coburn 1992, Mondain-Monval 1999, Mondain-Monval et al. 1999*). Increasing the size of steel pellets compensates for steel's lower density: hunters switching to steel should use shot at least two sizes larger than the lead loads that they are used to. Steel shot cartridges are loaded with a greater volume of shot to ensure an effective number of pellets per cartridge. Hunters should preferably not shoot from a distance greater than 35 m when using steel shot, which is a distance generally considered preferable regardless of shot type (*Scheuhammer & Norris 1995, Mondain-Monval 1999, VHJ 2000, Env. Can. 2001*).

The decreased pellet deformation of steel compared to lead actually entails two advantages: firstly, little deformation of the pellets allows for a very uniform shot column, increasing the number of pellets striking the target. This significantly decreases the potential for crippling birds. Secondly, decreased pellet deformation causes shot pellets to have a relatively smaller surface when hitting the target. In contrast, flattened lead pellets with a larger surface pull feathers down into the wound channel, decreasing penetration and reducing effectiveness to quickly kill the target (*Env. Can. 2001*). In fact, a steel pellet with an energy level equivalent to that of a lead pellet, provides 5% to 10% deeper penetration (*Remington 2001*).

5.2.6 Different skill requirements

Crippling losses are generally approximately 20-45% (*USFWS 1986, Nieman et al. 1987*). All research indicates that, whether lead or an alternative shot type is used, it is the hunter's capability which determines how many birds are crippled, and not the shot type. A hunter who practices sufficiently with steel shot does not cripple more birds when using steel shot than when using lead. Therefore, government wildlife agencies have a large responsibility to provide hunters with ready access to information and training so that shooting efficiency can be improved and crippling of game animals reduced. If hunters and wildlife managers are prepared to take their respective responsibilities regarding this issue seriously, excessive crippling may be controlled, regardless of the type of shot hunters use (*Scheuhammer & Norris 1995, Mondain-Monval 1999, Mondain-Monval et al. 1999, Env. Can. 2001*).

6. Conventions and agreements addressing the lead poisoning issue: Current situation and developments

The selection of conventions and agreements presented here is not a complete overview of all conventions and agreements addressing the conservation of waterbirds and/or wetlands. Rather, the same selection of convention and agreement secretariats that were queried in 1995 and 1997, were queried again in 2000 for reasons of continuity. The previous two editions of this report, however, had a strong European focus, whereas this report aims to provide information from other continents as well. Therefore, the Ramsar Convention was added to this edition, as well as the Asia-Pacific Migratory Waterbird Conservation Strategy. There are, however, more international (either world-wide or region specific) conventions and agreements, which either did not respond, or were not queried (e.g. the North American Waterfowl Management Plan, NAWMP, formulated by Canada, the USA and Mexico).

6.1 The Ramsar Convention

The Convention on Wetlands of International Importance, signed in Ramsar, Iran, in 1971 (and therefore commonly known as the Ramsar Convention), is an intergovernmental treaty which provides the framework for national action and international co-operation for the conservation and wise use of wetlands and their resources. There are presently 123 Contracting Parties to the Convention, with 1069 wetland sites, totalling 81 million hectares, designated for inclusion in the Ramsar List of Wetlands of International Importance (*Ramsar 2001a, June 2001*).

The Ramsar Convention does not specifically address the lead poisoning issue, but addresses it indirectly by urging its contracting parties to conserve wetlands and their species, and to use them sustainably. Recommendation 6.14 provides a framework within which the toxic threats to wetlands should be addressed: "Many of the principles articulated in the Convention, such as wise use, environmental impact assessment, and ecological character, should include recognition of the harmful impacts of toxics." Recommendation 9 (Promotion of Hunting Research and Education) addresses the conditions of hunting in internationally important wetlands. Firstly, this recommendation urges research organisations to obtain data on the breeding success, productivity and general mortality of the main species involved, and to carry out special studies on the effect of hunting on wildfowl populations. Secondly, it urges international and national hunters' organisations to:

- encourage sportsmanlike methods in hunting, and stop actions which obviously lead to mass destruction or loss of waterfowl;
- intensify educational measures to improve hunters' knowledge of different species of waterfowl; and
- make hunters aware of their responsibilities for conservation and wise use of waterfowl resources through proper hunting practices (*Ramsar 2001b, Ramsar 2001c, Ramsar, pers. comm.*).

6.2 The Bonn Convention (CMS, initiated by UNEP)

One of the conventions developed under the United Nations Environmental Programme (UNEP) is the Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or the Bonn Convention) (*UNEP 2001*). This convention aims to conserve terrestrial, marine and avian migratory species throughout their range. It is one of the small number of intergovernmental treaties concerned with the conservation of wildlife and wildlife habitats on a global scale. Since the Convention's entry into force on 1 November 1983, its membership has grown steadily to include 73 parties from Africa, Central and South America, Asia, Europe and Oceania (*CMS 2001*).

CMS parties work together to conserve migratory species and their habitats. Particular focus is on co-ordinated species conservation and management plans, conservation and restoration of habitat, control of factors impeding migration, co-operative research and monitoring, and public education and exchange of information among parties. In addition, strict protection is provided for a specified number of endangered migratory species (*CMS 2001*).

Several agreements have been concluded under CMS. These may range from legally binding treaties to less formal memoranda of understanding. The most important agreement with regard to the lead poisoning issue is the AEWA (African-Eurasian Migratory Waterbird Agreement, formally,

Agreement on the Conservation of African-Eurasian Migratory Waterbirds) (*CMS 2001, AEWA 2001*), which is described below.

Since the last International Update Report on Lead Poisoning in Waterbirds (*Kuivenhoven et al. 1997*), CMS has taken no further action on the matter of lead poisoning; however, considerable progress has been made under the AEWA (*CMS, pers. comm.*).

6.3 AEWA (under CMS)

The African-Eurasian Migratory Waterbird Agreement, the largest and most ambitious agreement developed so far under CMS, was concluded on 16 June 1995, when delegates from 64 countries and representatives from United Nations bodies, intergovernmental and non-governmental organisations met in The Hague, The Netherlands. The AEWA entered into force on 1 November 1999, after the required number of at least 14 Range States, comprising 7 from Africa and 7 from Eurasia, had signed and ratified the Agreement. A few days later the first Meeting of the Parties took place in Cape Town, South Africa (*AEWA, pers. comm.*).

The AEWA covers 172 species of birds ecologically dependent on wetlands for at least part of their annual cycle, including many species of pelicans, storks, flamingos, swans, geese, ducks, waders, gulls and terns. The agreement encompasses 117 countries (plus the European Union) from Europe, parts of Asia and Canada, the Middle East and Africa. In fact, the geographic area covered by the AEWA stretches from the northern reaches of Canada and the Russian Federation to the southernmost tip of Africa. Currently, the number of Contracting Parties is 31 (*AEWA, pers. comm.; AEWA 2001*).

The agreement provides for co-ordinated actions to be taken throughout the migration systems of the waterbirds to which it applies. Parties to the agreement engage in a wide range of conservation actions, which are described in a comprehensive action plan. This detailed plan is the product of extensive negotiations and discussions among governments, and addresses issues like species and habitat conservation, management of human activities, research and monitoring, education and information, and implementation. A key element of the AEWA Action Plan are the Conservation Guidelines, one of which, the Guideline on Sustainable Harvest, gives advice to parties to the Agreement on best practice and policy for hunting (*AEWA 2001*).

At its first session the Meeting of Parties adopted 14 resolutions. In addition to the resolutions on institutional, administrative or financial matters, a number of resolutions were adopted which focused on technical matters, dealing with substantive issues of the Agreement. Among them there is a Resolution on phasing out lead shot in wetlands (*AEWA, pers. comm., AEWA 2001*).

Paragraph 4.1.4 of the Action Plan reads as follows: **Parties shall endeavour to phase out the use of lead shot for hunting in wetlands by the year 2000.** It was acknowledged by the Meeting of the Parties that many Range States currently have technical difficulties in phasing out lead shot. Therefore, the Technical Committee of AEWA was requested to review the experience of those countries that have done it, or endeavour to do it. Based on this review and in consultation with the hunting organisations, gun and ammunition manufacturers and traders, the Technical Committee has been requested to bring elaborated guidance to the Meeting of the Parties at its second session scheduled for September 2002 (*AEWA, pers. comm.*).

At its first session, the Meeting of the Parties also adopted the International Implementation Priorities AEWA 2000 - 2004. One of the projects mentioned in this Plan is the Review of the use of non-toxic shot for waterbird hunting (i.e. the current report). Besides this review, workshops are also foreseen to provide important guidance for decision-makers and hunters' organisations on how to solve this problem. The Agreement Secretariat, in close co-operation with the Federation of Associations for Hunting and Conservation of the EU (FACE), and with financial support from the International Hunting Council (CIC) and Switzerland, has taken the lead to organise a workshop on the use of non-toxic shot, which will take place in Romania in October 2001. Its target group will be representatives of hunters' organisations in Eastern Europe, and its goal will be to raise awareness of the impact of lead poisoning of waterbirds and to make this user group familiar with substitutes for lead shot. During practical instruction sessions, hunters will be able to practice shooting with non-toxic alternatives (*AEWA, pers. comm., CIC, pers. comm.*).

Although remarkable progress has been made regarding phasing out lead shot, in particular in Western Europe, there is still a long way to go before it can be banned entirely for hunting in wetlands within the Agreement area. The Agreement Secretariat will continue to urge Contracting Parties and non-Contracting Parties to endeavour to phase out the use of lead shot (*AEWA, pers. comm.*).

6.4 The Bern Convention (*initiated by the Council of Europe*)

The Council of Europe, founded in Brussels and signed in London in 1949, is an independent, intergovernmental organisation with several humanitarian, democratic, and cultural aims. Its mission statement also includes environmental protection. The Council of Europe, which has 43 member states, should not be confused with the European Union. The 15 European Union states, however, are all members of the Council of Europe (*CoE 2001a*).

The Council of Europe has a purely consultative function. Its work leads to European conventions and agreements in the light of which member states may subsequently harmonise and amend their own legislation to comply with them. Some conventions and agreements are also open for adoption by non-member states. The results of studies and activities are available to governments in order to foster co-operation and social progress in Europe (*CoE 2001a*).

The conventions and agreements are organised in the European Treaty Series (ETS). One convention, listed as ETS no. 104, particularly addresses amongst others the issue of lead poisoning: the Convention on the Conservation of European Wildlife and Natural Habitats. This convention is also known as the Bern Convention (*CoE 2001b*).

The Bern Convention entered into force in 1982 and is also open to European and African non-member states. It has been ratified by 35 member states, the European Economic Community, Monaco and three African states (Burkina Faso, Senegal and Tunisia) (*CoE 2001a, 2001b*).

The Convention aims to protect rare and endangered animal and plant species and natural habitats. It lists protected species, contains provisions for protecting natural habitats, regulates the methods used to exploit certain species, and asks states to regulate trading in animals, particularly rare species. Special attention is given to endangered and vulnerable species, including endangered and vulnerable migratory species specified in appendices. Many of these species (e.g. ducks, geese, swans, loons, waders, and raptors) are, due to their preferred habitat and feeding methods, most at risk of lead poisoning (*CoE 2001b, CWS 2001*).

Recommendation No. 28 concerns the use of non-toxic gunshot in wetlands. After the adoption of this recommendation by the Standing Committee of the Bern Convention in 1991, no further activities have been undertaken on the specific matter of lead poisoning. However, lead poisoning is mentioned as one of the main causes of mortality in the Marbled Teal (*Marmaronetta angustirostris*), for which a European Action Plan (drafted by Wetlands International) was adopted by the Bern Convention. This plan is monitored by a Bern Convention/ BirdLife International Group of Experts on Bird Conservation, which meets every two years and gives the Contracting Parties advice on the implementation of the plans. The Plan has also been approved by the European Commission's Ornis Committee and endorsed by CMS COP5 (*CoE, pers. comm., BLI, pers. comm.*).

6.5 The Birds and Habitat Directives (*initiated by the European Commission*)

The European Commission is the executive body of the European Union and, in that capacity, responsible for designing, implementing and managing policy and legislation within the EU (*EU 2001a*). In order to conserve biodiversity in the EU, legislation has been adopted in the form of the Birds and Habitat Directives. The Ornis Committee, operating under the EC Environment Directorate and consisting of representatives of the 15 EU member states, takes decisions to implement the Birds Directive EC/79/409. The issue of lead poisoning in waterbirds has been discussed in this regard; the Committee has not proposed any joint EU action but has recommended that each member state takes its own measures. Consequently, the European Commission has neither proposed nor taken any action in this field (*EC 2001, EC, pers. comm.*).

6.6 The Asia-Pacific Migratory Waterbird Conservation Strategy

Conservation of migratory waterbirds and wetlands in the Asia Pacific region has been promoted through the Asia-Pacific Migratory Waterbird Conservation Strategy. The Strategy, an international co-operative initiative, has core financial support from the governments of Japan and Australia and is co-ordinated by Wetlands International. The Strategy is endorsed by the Convention on Wetlands and the Convention on Migratory Species. Eleven countries (Russian Federation, Mongolia, China, Korea (D.P.R.), Korea (R.), Japan, Philippines, Indonesia, Papua New Guinea, Australia, and New Zealand) are currently joining the Strategy (*WIJ, pers. comm., Ramsar 2001d*).

During the first phase of the Strategy (1996-2000), three networks have been developed (East Asian-Australasian Shorebird Site Network, North East Asian Crane Site Network, Anatidae Site Network in the East Asian Flyway). These networks now span 68 sites in 12 countries and are still growing. The networks are established to promote and support on-site conservation, public awareness, training, research, and related activities, to link the people at and across sites, and to use these sites as models to demonstrate sound management within the country.

During the next phase of the Strategy (2001-2005), under the three species-group Action Plans, activities are being planned to enhance the development of these networks. Environment Australia, as a member of the Asia-Pacific Migratory Waterbird Conservation Committee (MWCC), and the Ministry of Environment of Japan will support this process financially, possibly also with funds from UNEP's GEF (Global Environment Facility).

Some of the activities in the framework of the Strategy for 2001-2005 are:

- Review current and proposed projects relating to migratory waterbird and wetland habitat conservation efforts in the Asia-Pacific flyways.
- Identify and gain the agreement and endorsement of a number of appropriate eligible developing countries from the flyway.
- Establish and maintain co-operation and co-ordination with the Governments of Japan, New Zealand and Australia (as the developed countries of the flyway), the Asia-Pacific Migratory Waterbird Conservation Committee (MWCC), the Secretary-Generals/Executive Secretaries of the Ramsar, Migratory Species and Biodiversity Conventions; BirdLife International, IUCN, WWF, Wetlands International and others (*WIAP, pers. comm., WIJ, pers. comm.*).

The Strategy is has no legal basis. The lead poisoning issue is currently not being discussed within the Strategy, since protecting habitats and getting legal protection for endangered species are considered to be higher priorities at the moment. However, the Wetlands International Office in Japan has held a national workshop on this subject (*WIAP, pers. comm.*).

6.7 The Declaration on Risk Reduction for Lead (*initiated by the OECD*)

The Organisation for Economic Co-operation and Development (OECD) is an intergovernmental organisation in which representatives of 30 industrialised countries in North America, Europe and the Pacific, as well as the European Commission, meet to co-ordinate and harmonise policies, discuss issues of mutual concern, and work together to respond to international problems. Most of the OECD's work is carried out by more than 200 specialised committees and subsidiary groups made up of country member delegates.

The OECD, as part of its Risk Management Programme, has been investigating problems associated with lead since 1991. In addition to producing a background document on lead (*OECD 1993*), the OECD organised a workshop in Toronto in 1994 investigating international views on the (eco)toxicological risks associated with lead, and providing directions for improved risk assessment and management. The workshop also specifically addressed the environmental risks associated with the use of lead shot and lead fishing sinkers, including the impact on waterbirds (*Kuivenhoven et al. 1997, OECD 2001*).

Leading on from the OECD workshop discussions and previous work for the Risk Management Programme, Environment Ministers from OECD member nations adopted a "Declaration on Risk Reduction for Lead" in 1996 (*OECD 1999, 2001*). The purpose of the Declaration was to advance national and co-operative efforts to reduce the risk from exposure to lead, giving high priority to certain actions. One such action was to **restrict the use of lead shot in wetlands and promote the use of alternatives to lead sinkers in shallow waters** (*OECD 1999*). In support of this Declaration, the lead industry (e.g. paint, battery, fuel and ammunition manufacturers) was encouraged to make best use of its expertise by making it available to OECD and non-OECD countries, and to develop a voluntary programme with activities to reduce lead exposure, in co-operation with national authorities and OECD countries (*Kuivenhoven et al. 1997, OECD 2001*).

As part of its work on Risk Management, the OECD issued a "status report monograph" on lead in 1999 (*OECD 1999*). In this report, which is based on questionnaires filled in by member states, the observation is made that Belgium, Canada, Sweden and the USA have made considerable progress concerning their legislation on the use of lead shot and fishing weights.

7. International Hunters' Organisations: Current view on the lead poisoning issue

The selection of international hunter's organisations discussed here does not represent a complete overview. Rather, the same selection of organisations that were queried in 1995 and 1997, were queried again in 2000 for reasons of continuity. There are, however, more international hunter's organisations, which were either not queried, or did not respond.

7.1 FACE

The Federation of Associations for Hunting and Conservation of the EU (FACE) was founded in September 1977 by the national hunters' associations of the Member States of the European Union. FACE membership is open to representative national hunters' associations from all Council of Europe Member States, including those beyond the European Union borders. At present, it has members in 28 countries: the fifteen EU countries plus Bulgaria, Croatia, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Malta, Poland, Romania, Slovakia, Slovenia, and Switzerland. Through its members, FACE currently represents approximately 7 million European hunters (*FACE 2001*).

FACE is co-operating with a few other international sport shooting federations, as well as gun and ammunition manufacturing federations, in the European Shooting Sports Forum. This forum is associated with CIP (International Body for Proofhouses) and Wetlands International.

As an active member of IUCN (World Conservation Union) since 1987, FACE contributes to wildlife conservation in several ways. Its policy on all forms of hunting is aligned to the now universally accepted principle of "wise use". In line with this policy, it aims to eliminate wasteful losses of bird populations and pollution of habitats. Hunters' organisations are currently giving serious thought to lead poisoning through ingestion of deposited lead, in particular of waterfowl in wetland areas. FACE believes the issue of lead shot can only be solved by

- working to a realistic, not arbitrary (as under AEWA), timescale;
- sufficient support for research, development and information; and
- the adoption of international proofing and safety standards (*FACE, pers. comm.*).

According to FACE, there are still a number of real problems: the safety element (in particular for steel shot) as well as the availability and the cost factor. FACE believes that the best way to solve the lead poisoning problem would be not to concentrate on more, often detailed, research or to lobby for more restrictions or legal bans, but to focus on the information, education, and awareness raising aspect. Especially the technical and ballistic aspects of non-toxic shot should be addressed, as well as the funding of training and education campaigns for hunters (*FACE, pers. comm.*).

7.2 CIC

The Migratory Bird Commission of the International Hunting Council (CIC, Conseil International de la Chasse) has been concerned with the issue of lead poisoning for a number of years. In 1992 a resolution was issued on that matter. Currently, the AEWA-secretariat is planning a workshop on non-toxic shot in Romania in 2001, together with FACE, and probably with financial contributions from CIC and Switzerland. The intention is to convince the hunters of these regions of the efficiency of non-toxic shot for waterfowling. FACE and CIC will organise the practical part of this workshop, where hunters themselves will get the opportunity to practice shooting with non-toxic shot. CIC considers this an important step forward (*CIC, pers. comm.*).

8. Current situation and developments in individual countries

The overall response of individual countries to the 2000 questionnaire survey was 54% (74 out of 137); of contracting parties to the Bonn (CMS) Convention, 62% responded. For the AEWA and the Bern Convention, the response was 72% and 71%, respectively.

In order to quantify the current 'status' of a country's legislation, and its progress since the first International Update Report on Lead Poisoning in Waterbirds in 1995, all countries were classified according to the schedule below:

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 informer 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)

Table 1 shows the classification of all responding countries in 1995, 1997 and 2000, as well as the convention status of each country in 2000. The complete answers to the questionnaire can be found in Appendix II (table with the answers to all yes/no questions) and III (complete description of the situation in each country, including contact addresses). Table 2 shows the total number of countries in each category, both in absolute numbers and in percentages.

Table 1: Legislation concerning the use of lead shot, and convention status of responding countries, sorted by category in the year 2000 (for a complete, alphabetical overview please refer to Appendix II)

Country	1995	1997	2000	Ramsar	Bonn (CMS)	AEWA	Bern	Asia-Pac.	EU (Birds& Hab.Dir.)	OECD (Decl.Risk Red.)
Canada	E	A	A	x						x
Denmark	E	A	A	x	x	x	x		x	x
Finland	E	A	A	x	x	x	x		x	x
Netherlands	A	A	A	x	x	x	x		x	x
Norway	A	A	A	x	x		x			x
Switzerland	B	B	A	x	x	x	x			x
USA	A	A	A	x						x
Australia	B	B	B	x	x			x		x
Belgium(Flanders)		B	B	x	x		x		x	x
Cyprus			B				x			
Ghana			B	x	x					
Israel			B	x	x					
Japan	E	C	B	x				x		x
Latvia	E	E	B	x	x		x			
Malaysia			B	x						
Spain	F	F	B	x	x	x	x		x	x
Sweden	B	B(C)	B	x	x	x	x		x	x
United Kingdom	B	B	B	x	x	x	x		x	x
South Africa	D		B(D)	x	x	x				

Country	1995	1997	2000	Ramsar	Bonn (CMS)	AEWA	Bern	Asia- Pac.	EU (Birds & Hab. Dir.)	OECD (Decl. Risk Red.)
Russ. Federation	F	F	B(F)	x				x		
Germany	C	C	C	x	x	x	x		x	x
Argentina		F	D	x	x					
Austria	D	D	D	x			x		x	x
Belarus	D		D	x			x			
Cambodia			D	x						
Cameroon			D		x					
Chile		D	D	x	x					
Congo			D	x	x	x				
Iceland	D	D	D	x			x		x	x
Ireland			D	x	x	x	x			x
Kenya			D	x	x					
Lithuania			D	x			x			
Luxembourg			D	x	x	x	x		x	x
Malawi			D	x						
Malta	F	F	D	x	x		x			
Mauritania			D	x	x					
Morocco	D	D	D	x	x	x	x			
Romania	D	U	D	x	x	x	x			
Slovak Republic			D	x	x		x			x
Zimbabwe			D							
Botswana			E	x						
Czech Republic	F	F	E	x	x		x			x
France	E	E	E	x	x	x	x		x	x
Greece		E	E	x	x		x		x	x
Albania	E		F	x			x			
Bosnia Herz.			F							
Brazil		F	F	x						
China		F	F	x				x		
Croatia	F		F	x	x	x	x			
Ecuador			F	x						
Egypt			F	x	x	x				
Gabon			F	x						
Hungary	F	F	F	x	x		x			x
Iran			F	x						
Italy	F	F	F	x	x		x		x	x
Kuwait			F							
Mali			F	x	x	x				
Moldova			F	x	x	x	x			
Namibia			F	x						
Peru			F	x	x					
Thailand			F	x						
Ukraine			F	x	x		x			
Gambia			U	x		x				
Algeria	N		N	x						
Cape Verde			N							
India	N	N	N	x	x					
Lebanon			N	x						
Liberia			N							

Country	1995	1997	2000	Ramsar	Bonn (CMS)	AEWA	Bern	Asia- Pac.	EU (Birds& Hab.Dir.)	OECD (Decl.Risk Red.)
Monaco			N	x	x	x	x			
Sri Lanka			N	x	x					
Sult. of Oman			N							
Togo			N	x	x	x				
Uganda			N	x	x					
Un. Arab Emirates			N							
Estonia		F		x			x			
Indonesia		D		x				x		
Macedonia		F		x	x	x	x			
Mexico		B		x			x			x
New Zealand	E			x	x			x		x
Portugal	D			x	x		x		x	x
Turkey	F			x			x			x

Table 2: Totals of each category per year

	1995		1997		2000	
	#	%	#	%	#	%
A	3	9	6	17	7	9
B	4	12	6	17	13	18
C	1	3	2	6	1	1
D	7	21	5	14	19	26
E	8	24	3	9	4	5
F	8	24	11	31	18	24
U	0	0	1	3	1	1
N	2	6	1	3	11	15
Total	33		35		74	

Compared to 1995 and 1997, approximately twice as many countries were queried in 2000. Many of the 'new' countries were non-contracting parties to the relevant conventions, and often non-EU and non-OECD countries. Since these countries are therefore less likely to have any legislation concerning the use of lead shot, the quantification in Table 2 gives a somewhat biased picture: the numbers in 2000 imply that the relative number of countries with legislation has decreased, whereas this effect appears to be entirely caused by the enlargement of the sample group. Therefore, when making comparisons between years, it is more useful only to analyse those countries which responded in more than one year. Table 3 and figure 1 show the category distribution after this correction. For comparison, Table 4 shows the category distribution of countries which were queried for the first time in 2000.

Table 3: Totals of each category per year; only countries which responded in more than one year

	1995		1997		2000	
	#	%	#	%	#	%
A	3	10	6	19	7	19
B	4	13	5	16	9	25
C	1	3	2	6	1	3
D	6	20	4	13	8	22
E	7	23	3	10	3	8
F	7	23	9	29	6	17
U	0	0	1	3	0	0
N	2	7	1	3	2	6
Total	30		31		36	

Table 4: Totals of each category in 2000; only countries which were queried for the first time in 2000

	2000	
	#	%
A	0	0
B	4	11
C	0	0
D	11	29
E	1	3
F	12	32
U	1	3
N	9	24
Total	38	

Firstly, it is apparent that the percentage of countries which have legislation concerning the use of lead shot is indeed considerably higher in the group of countries which responded at least once before ($A+B+C=47\%$) than in the group of countries which were queried for the first time in 2000 ($A+B+C=11\%$), which makes it necessary to only use the former group when making comparisons between years. This way it is apparent that the percentage of countries with statutory or voluntary regulations concerning the use of lead shot shows a steady increase since 1995, and that this increase was primarily accomplished between 1995 and 1997 (see figures 1 and 2).

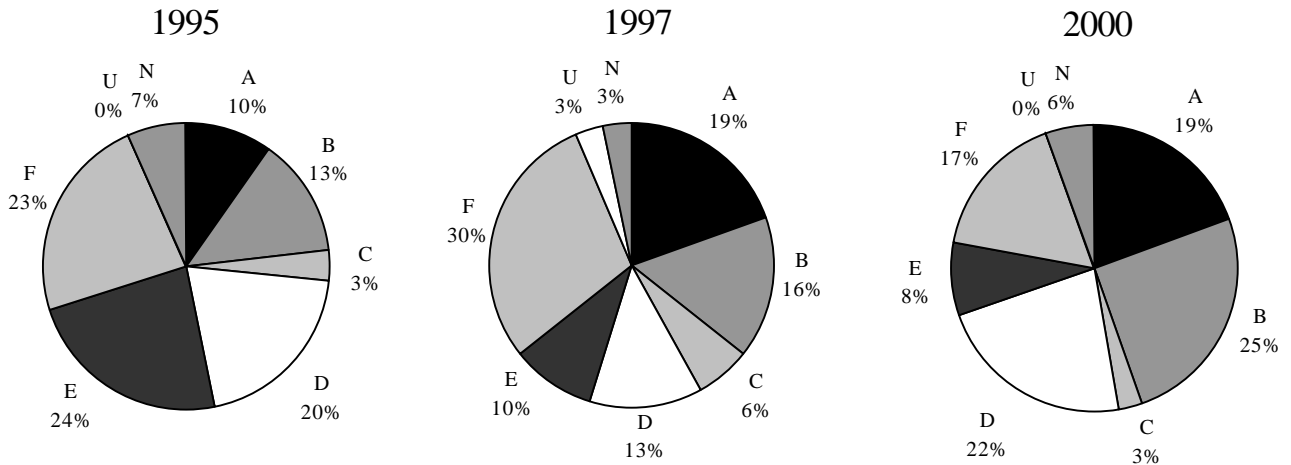


Figure 1: Category distribution in 1995, 1997 and 2000 (only countries which responded in more than one year). A=total statutory ban; B=partial statutory ban; C=voluntary ban; D=no ban, but hunting only small-scale; E=no ban, legislation is considered; F=no ban, legislation is not considered; U=unknown; N=no waterbird hunting.

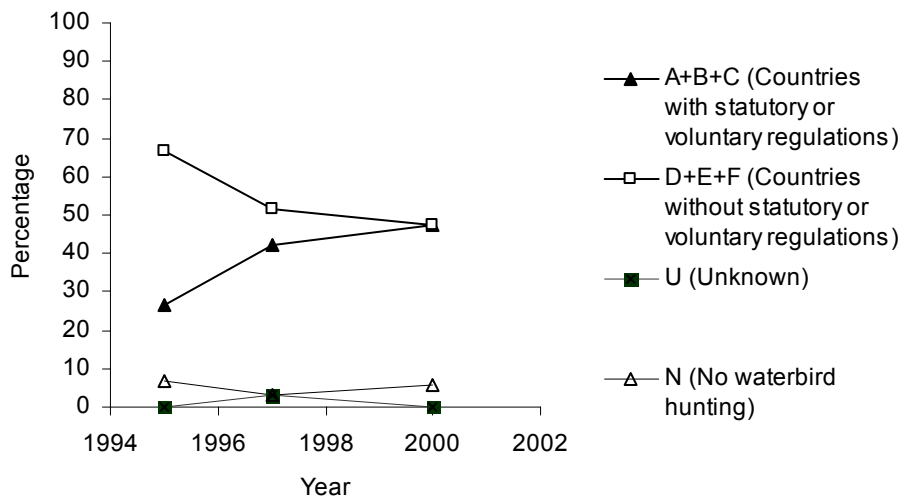


Figure 2: Development of the percentages of countries in the different categories from 1995 to 2000

Overall, 38% of the countries which responded more than once, and which did not already have a total statutory ban, made progress concerning their regulations since the 1995 survey (moving not necessarily from non-legislation to legislation, but at least one category higher up). Most of this progress was accomplished between 1995 and 1997 (1997-2000: progress in 30% of those countries, vs. 19% in the period 1995-1997). Interestingly, however, most of the shift from non-legislation to legislation was accomplished between 1995 and 1997 (see figure 2). An example for the two different kinds of progress is that in the period 1997-2000, category B increased significantly (see figure 1), but since this increase was at the expense of category C, the total of countries with legislation ($A+B+C$) shows only a minor increase (see figure 2).

The progress of countries which ratified the Bonn, AEWA or Bern conventions, does not differ significantly from this overall average, nor from that of countries which did not ratify the respective

conventions. However, when looking at the absolute situation, and not merely at the development over time, it appears that the percentage of AEWA countries which currently have statutory or voluntary regulations (A+B+C) is higher in all three years than that of non-AEWA countries (1995: 38% vs. 18%; 1997: 62% vs. 28%; and 2000: 67% vs. 30%, respectively). This difference is not present, or if present, not significantly so, for the other conventions. This analysis was not performed for Ramsar countries, because this convention includes the vast majority of countries which responded to the questionnaire.

Countries were asked to roughly estimate the amount of lead present in their wetlands. Table 5 shows these estimates calculated for all responding countries, and also calculated only for countries which had responded at least once before. The majority of countries report the estimated amount of lead to be medium.

Table 5: Estimated amount of lead present in wetlands on an arbitrary scale

Estimated amount of lead present in wetlands	Countries which responded at least once before (%)	Countries which were queried for the first time in 2000 (%)	Total for all responding countries in 2000 (%)
None	19	24	22
Small	6	36	22
Medium	41	27	33
Large	28	6	17
Unknown	6	6	6

Table 6 shows levels of a few parameters in relation to legislation (monitoring, enforcement, and preparation of new legislation), in addition to the percentage of countries in which lead shot is still used for hunting waterbirds. For comparison, the percentage of countries which currently have legislation (see also tables 2, 3 and figure 1) is given as well. It is apparent that the countries which were queried for the first time in 2000 do not significantly differ from the countries which responded at least once before, apart from the percentage of countries which currently have legislation. Apparently, monitoring, enforcement and preparation levels are comparable world-wide regardless of a country's convention status. It is noteworthy that countries which already have legislation, engage significantly more in the preparation of new legislation than countries which do not have any legislation.

Table 6: State of legislation parameters in 2000

Legislation, monitoring and enforcement	Countries which responded at least once before (%)	Countries which were queried for the first time in 2000 (%)	Total for all responding countries in 2000 (%)
Lead shot is being used for waterbird hunting	83	81	82
There is legislation concerning the use of lead shot	44	11	28
If legislation, the use of lead shot is being monitored	63	75	65
If legislation, there is effective enforcement	56	50	55
New legislation is being prepared:			
Overall (countries with and without legislation)	46	34	40
Countries with legislation	69	75	70
Countries without legislation	25	28	27

Table 7 shows awareness, research, and co-ordination levels. Percentages indicate that not all countries in which there is an awareness of the problem, engage in awareness raising, research, or co-ordination activities. Especially the availability of information materials is low. In countries which were queried for the first time in 2000, the awareness, research and co-ordination levels are relatively low compared to the countries which responded at least once before.

Table 7: Levels of awareness, research, and co-ordination concerning the lead poisoning problem

Awareness, research, and co-ordination activities	Countries which responded at least once before (%)	Countries which were queried for the first time in 2000 (%)	Total for all responding countries in 2000 (%)
There is an awareness of the problem	65	18	41
There have been, or will be, media/ education campaigns	38	18	28
Information materials are available	36	3	19
Research is being done	58	8	33
Non-toxic shot is being developed	40	5	22
There have been research publications	55	21	38
There are working groups/committees addressing the issue	41	11	26

Several reasons were given for the absence of, or impediment to, development of legislation, awareness, research and co-ordination (see also Appendix III):

- There is either no awareness of the problem, or a disbelief in the harmful impact of lead on the environment.
- There is an awareness of the problem, but it is 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).
- There is an awareness of the problem, but a lack of expertise, finances and logistics inhibit developments.
- The scale of the problem is unknown. There is a need for research, but financial and logistical problems inhibit developments.
- 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.
- Legislation, awareness campaigns, research and/or co-ordination are being considered, but due to bureaucratic reasons this process is very slow.
- The lead poisoning problem is not on the priority list for political reasons (war, transition period, political unrest).
- Non-toxic shot is not available.
- The production of non-toxic shot is prevented by manufacturers who determine the market and have strong political power.
- 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, effectivity, 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.

9. Discussion

The most important point of discussion is that the section of this report which analyses the current situation and progress in individual countries, is based on questionnaires which were filled in by informers of varying position and expertise. The contents of this section are therefore only as accurate as the contributions Wetlands International received. However, it is important to realise that it is the state of knowledge and awareness which determines the extent to which authorities and hunters are able and willing to amend legislation, and to switch to the use of non-toxic shot, respectively. Also, considering the fact that independent research in all countries would be logistically and financially impossible, research using questionnaires is, although clearly not preferable, the only feasible way to survey the scale of the problem and the levels of legislation and awareness.

Considering the fact that the countries which responded at least once before (predominantly OECD or EU countries, and often contracting parties to the relevant conventions), have relatively more legislation concerning the use of lead shot compared to the larger sample group of 2000 (see chapter 5), it is notable that the average estimate of the amount of lead present in wetlands is larger in this smaller group. An explanation for this could be that the lead poisoning problem is indeed of relatively more importance in these countries. This could be explained by the fact that waterbirds are primarily hunted with guns in these regions, in contrast to, for example, many African countries where it is more common to catch birds with nets or traps. Alternatively, however, the awareness of the problem might be higher in the developed countries (as a consequence of better logistics and finances allocated to research), and in turn their ability to correctly judge the amount of lead present in wetlands (which, as indicated earlier, might actually be larger too). In other words, the more a country knows about the problem, the larger it will judge the scale of it to be. This has important implications for the interpretation of the data presented in chapter 5: the judgement of the lead poisoning problem appears to be highly subjective. If a country reports a deterioration of the situation, this might therefore actually mean that the awareness of the problem has increased. It might of course also mean that it was a different informer who responded for that particular country this time, and that this informer had other (less/more accurate or recent) information at his or her disposal. This is, for that matter, something which could be more generally the case, and not only in countries which reported a deteriorated situation.

In some cases, the classification system used in chapter 5 might be misleading. Category B, for example, does not distinguish between countries which have a ban on the use of lead shot for all but one or two species in all wetlands, and countries which have a ban in only one or two wetlands. However, a system with more categories was judged to be confusing and unfit for this purpose. It should therefore not be concluded, for example, that countries in category B are necessarily at the highest feasible level of legislation; these countries, too, should keep improving their legislation, parallel with their logistics and education for hunters.

Similarly, the binary system (1=yes, 0=no) used for the quantitative analyses is not always fully appropriate. Firstly, when two informers responded differently for a particular country, the yes-value was used in the analyses; this might bias the results positively. Secondly, there were many cases in which informers responded "yes, although..." referring to a certain situation, while other informers responded "no, although..." while referring to a very similar situation. Thirdly, similar to the flaw in the classification system, when an informer answers "yes" to a question, for example the question asking whether there is any awareness of the problem, this does not say anything about the degree of awareness, nor about the group where there is an awareness (e.g. only amongst environmentalists). However, this system was judged to be the only way in which the problem could be usefully quantified.

Finally, it might be the case that respondents knowingly underestimated the scale of the problem and/or overestimated their monitoring, enforcement, awareness and co-ordination levels in order to avoid focusing attention on the fact that they do not make a sufficient effort to comply with the conventions they ratified.

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Nienke Beintema
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Env. Can. 2001: <http://www.pnr-rpn.ec.gc.ca/info/articles/ca00s02.en.html>

FACE 2001: <http://www.face-europe.org>

FACE pers. comm.: Correspondence with FACE secretariat

NRE pers. comm.: Questionnaire filled in by the Department of Natural Resources and the Environment, Victoria, Australia

OECD 1999: <http://www.oecd.org/ehs/ehsmono/#risk>; linkto <http://www.oecd.org/ehs/ehsmono/leadpart1.pdf>

OECD 2001: <http://www.oecd.org>

Ramsar 2001a: <http://www.ramsar.org>

Ramsar 2001b: http://www.ramsar.org/key_final_act_1971.htm

Ramsar 2001c: http://www.ramsar.org/key_rec_6.14.htm

Ramsar 2001d: http://www.ramsar.org/forum_asia-pacific_waterbird1.htm

Ramsar pers. comm.: Correspondence with The Ramsar Convention Bureau

Remington 2001: <http://www.remington.com/AMMO/PAGES/Shotshell/steelselect.htm>

UNEP 2001: <http://www.unep.org>

WIBSP pers. comm.: Questionnaire filled in by Wetlands International Black Sea Programme, Ukraine

WIAP pers. comm.: Correspondence with the Wetlands International Asia Pacific office

WIJ pers. comm.: Correspondence with the Wetlands International Japan office

Appendix I: Questionnaire which was sent to individual countries

LEAD POISONING IN WATERBIRDS

2000 Update

Your answers to the questions will be edited as a contribution to the International Report. For countries that sent in information for the 1997 Report, please concentrate your comments on **developments since 1997**.

If necessary, please provide your (brief) details on a separate sheet.

Note that it is also very important to fill in the questionnaire if **no** activities are underway!

1. GENERAL SITUATION

a. Is there any hunting of waterbirds with lead shot in your country?

- No
- Yes. Details: (e.g.: do you judge it to be a large scale activity?)

b. If there is hunting of waterbirds with lead shot, do you know or think that there is/must be a considerable amount of lead lying in and around wetland areas?

- No
- Yes. Which do you judge the amount to be (we realise this is difficult to answer):
 - fairly small
 - "medium"
 - (very) large
- Does not apply

2. POLICY AND LEGISLATION, INCLUDING VOLUNTARY USE OF NON-TOXIC SHOT

a. Are there any voluntary or statutory measures in your country to promote the use of non-toxic shot in the hunting of waterbirds?

- No
- Yes. Details:

b. Has any action been taken in your country to monitor the use of non-toxic shot in situations required by the voluntary or statutory measures described under 2a?

- No
- Yes. Details:

Does not apply

c. If there are statutory measures, are they effectively enforced?

No

Yes. Details: (please explain how they are enforced, if they are effective, and if not, what the main obstacles are)

Does not apply

d. Are there any proposals for actions such as the preparation of new laws or voluntary measurements, law enforcement campaigns, etc.?

No

Yes. Details: (please also indicate schedules for implementation)

3. AWARENESS

a. Is there an awareness of the problem of lead poisoning of waterbirds in your country amongst hunters, policy-makers, etc.?

No

Yes. Please explain how this is shown

b. Have there been, or are there going to be, any media/education campaigns about the lead poisoning issue?

No

Yes. Details: (please also indicate perceived issues that will need targeting in future campaigns)

c. Have any information materials on this issue been prepared for media or educational use?

No

Yes. Please append a list of materials, and include examples where possible.

4. RESEARCH AND DEVELOPMENT

a. Has any research been done in your country on the biological/ecological impact of lead poisoning on waterbirds?

- No
- Yes. Details:

b. Has anything been done in your country concerning the development of non-toxic ammunition?

- No
- Yes. Details (also including production/availability/cost):

c. Have there been any publications on this subject in your country?

- No
- Yes. Details: (please include descriptions of main publications and a full list of bibliographical references; where possible, include examples of publications)

5. CO-ORDINATION

Have any working groups/committees been established in your country with respect to the lead poisoning issue?

- No
- Yes. Details:

6. APPENDICES

Please include a list of relevant publications and a list of information materials produced.

Appendix III: Statements of individual countries in alphabetical order

Notes:

- Some of the statements below have been edited for clarity.
- The statements are a supplement to the “yes/no questions” in the questionnaire, and therefore they do not represent the complete situation. Please refer to Appendix II for a more complete overview.
- “We” refers to the authority in question, not to Wetlands International.
- If more than one authority responded for one country, the responses have been combined to form one logical statement. If responses differed between informers, the informer in question is given in Italics.

Albania

Hunting with lead shot is the only way of hunting in Albania, and for that reason we could say it is a large-scale activity. There is no policy or legislation concerning the use of lead shot.

AWARENESS

For the moment there are no media/education campaigns in Albania. Something should be done first with institutions responsible for fauna administration. They are represented by the General Directory of Forests and Pastures and the National Environment Agency. Both institutions should be informed on the lead poisoning issue.

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Algeria

Although there is no legislation concerning the use of lead shot, hunting has been banned throughout the country since 1991. However, there is still illegal hunting of waterbirds with lead shot in Algeria. There have not been any research projects or education campaigns on this issue.

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Argentina

Waterbird hunting is not a large-scale activity, although relatively important in the provinces of Entre Rios, Santa Fe, Corrientes and in rice cultivation areas. There is no policy or legislation concerning the use of lead shot, nor have there been any research projects or education campaigns. However, when provided with appropriate information, NGO's could be interested.

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Australia, general

In Australia, the Northern Territory and South Australia have already phased out the use of lead shot for waterfowl hunting. New South Wales and Tasmania support the development of education and information programs promoting the phasing out lead shot but have not set a time frame. In Queensland, the use of lead shot was banned in three sites and a voluntary ban will be in place for all other wetlands in 2001; a complete ban is expected in 2002 or 2003. In Victoria a complete ban is being implemented over a three-year period which started in 2000. For details, please see the information below.

Bruno Greimel

Address: see Australia Queensland

Australia, State of South Australia

Hunting waterfowl with lead shot is prohibited in South Australia under the National Parks and Wildlife Act, 1972. These regulations are well enforced by ranger staff in NPWSA Reserves but less so on private land due to inability to fund added inspectorial staff.

AWARENESS

High profile media campaigns were carried out when hunting regulations were changed (no lead shot) but the education campaign has waned with time. However, most hunters are now aware of requirements. Education pamphlets are available ("Hunting in South Australia"); regulatory pamphlets include promotion of and information on non-toxic shot.

RESEARCH AND DEVELOPMENT

Surveys of lead shot remnants in popular wetlands have been conducted. Some University of Adelaide undergraduate and post-graduate studies take place at the Bool Lagoon Ramsar Site.

CO-ORDINATION

The Wildlife Advisory Committee of South Australia deals with this issue.

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Australia, State of Queensland

Hunting with lead shot is allowed in Queensland. However, the Nature Conservation (Duck and Quail) Conservation Plan 1995 permits waterfowl hunting only during a declared harvest period (of up to 12 weeks) if the person holds a valid recreational wildlife harvesting licence for the nominated species. Waterfowl hunting in Queensland is only allowed on private property and hunters have to obtain permission from landholders before obtaining a licence.

Duck hunting is not a large-scale activity in Queensland. The number of licensed shooters dropped from 1779 in 1983 to 516 in 1999.

Note: The conservation plan consists of 3 parts. A legislative component, background information on the ecology and biology of the species listed and a management program. The legislative component is subordinate legislation to the Nature conservation Act 1992 (Queensland).

Prior to each hunting season the Queensland Parks and Wildlife Service, in consultation with key stakeholders reviews environmental conditions and waterfowl populations before determining the viability of a harvest period. The harvest period notice is gazetted as subordinate legislation and includes information on bag limits, areas where hunting is allowed and other additional conditions, such as a ban on the use of lead shot in certain areas, imposed for this year's season.

POLICY AND LEGISLATION

- The use of lead shot was banned in Queensland on 3 sites for the year 2000 duck harvest period.
- The ban was statutory and gazetted as subordinate legislation as part of the year 2000 Harvest Period Notice.
- All 3 sites are located on private property and have a long history of use for waterfowl hunting. These sites were part of a research project into lead contamination and results indicated that a ban of lead shot in these areas was warranted.
- The management program of the Nature Conservation (Duck and Quail) Conservation Plan 1995 is currently under review. Under the new management program the ban on 3 sites will continue.
- In addition, hunters will be encouraged to voluntarily use non-toxic shot in other areas where duck hunting will be permitted during the 2001 season. Education programs and Information kits will be provided to hunters during this period.
- It is envisaged to completely ban the use of lead shot in Queensland by 2002 or 2003 (the decision will be made as part of the review of the management program).
- The use of non-toxic shot is also promoted by various hunting and shooting organisations.

Monitoring the use of non-toxic shot

Statutory measures: Compliance with legislation was monitored and enforced by wildlife rangers of the Queensland Parks and Wildlife Service.

Voluntary measures: Self-regulation through clubs such as the Australian Sporting Shooters Association, Canine Control Council or the Game and Field Association.

Enforcement of statutory measures

The management program is delivered via stakeholder consultation, education, legislative provisions and enforcement. The enforcement component is generally effective. Compliance of regulations by hunters is very good and only 2 minor infringements were recorded in the past 5 years.

Enforcement duties are carried out by wildlife rangers of the Queensland Parks and Wildlife Service. Rangers check for compliance of regulations and are entitled to issue on the spot infringement notices or refer more serious offenders for prosecution.

Enforcement activities include:

- ensure that hunters have the appropriate licence and hunting is limited to the open season;
- checking the use of appropriate ammunition and weapons,
- numbers of ducks taken and species of duck taken;
- compliance with the stipulated daily time for hunting; and
- compliance with prescribed hunting practices, (use of decoys, dogs, etc)

Proposals for additional actions

As stated above, the management program of the Duck and Quail Conservation Plan is currently under review. This includes reviewing management options on the implementation on the use of non-toxic shot on a state-wide basis. To facilitate an effective transition from lead shot to non-toxic shot it is envisaged to develop additional education and information material for shooters.

AWARENESS

Policy makers and government: The Queensland Parks and Wildlife Service has, in conjunction with universities conducted several research projects into lead contamination. In addition, Queensland is represented on the Australian and New Zealand Environment and Conservation Council (ANZECC). ANZECC has produced a discussion paper on the use and impact of lead shot.

Hunters and Stakeholder Organisations: The Management Advisory Committee includes Officers of the Queensland Parks and Wildlife Service and representative of various stakeholder organisations (hunting clubs, shooting organisations, conservation groups and animal welfare organisations) has been established to discuss issues in regard to waterfowl management. One of the other major functions of the committee is the annual assessment of environmental conditions and population surveys before determining if a harvest season is to proceed.

This committee has previously recommended against a harvest period when environmental conditions could not guarantee a sustainable harvest and was also instrumental in banning the use of lead shot on nominated wetlands in Queensland.

Details of media/education campaigns will be finalised during the review of the management program. To date, the Queensland Parks and Wildlife Service with the aid of stakeholder organisations has produced an information pamphlet on the use of non-toxic shot.

RESEARCH AND DEVELOPMENT

Lead poisoning:

- Baxter, G. (1997). 'The prevalence of lead shot in the digestive tract of wild ducks, and in wetland sediments in Queensland'. Second Report to the Queensland Department of Environment, December 1997.
- Kingsford, R., Flanjak, J. and Black, S. (1989). Lead shot and ducks on Lake Cowal. Aust. Wildl. Res. 16(2):167-172.
- Koh, T. & Harper, M. (1988). Lead-poisoning in Black Swans, *Cygnus atratus*, exposed to spent lead shot at Bool Lagoon Game Reserve South Australia. Aust. Wildl. Res. 15(4):395-403.
- Lund, M., Davis, J. and Murray, F. (1991). The fate of lead from duck shooting and road runoff in three Western Australian wetlands. Aust. Journ. of Marine and Freshwater Research 42f(2)139-149.

Non-toxic shot:

- Department of Natural Resources and Environment. (1999). 'Give non-toxic a shot' - the facts about non-toxic shot. <http://www.nre.vic.gov.au/recreatn/game/non-toxic>.
- Forsyth, R. (2000). 'Duck hunting and change'. Sporting Shooters Association of Australia. <http://www.ssaa.org.au/duckhunt.html>
- Queensland Parks and Wildlife Service (2000). Information brochure on the use of non-toxic shot. The State of Queensland, Environmental Protection Agency. Note: In the near future this publication should be available on:
- <http://www.env.qld.gov.au/environment/plant/permits/>

A detailed list of additional publications can be found on:

<http://www.nre.vic.gov.au/recreatn/game/non-toxic/scientific.htm>

We are not aware that any Australian companies are involved in the development of non-toxic ammunition. According to ammunition suppliers and gun shops non-toxic shot is currently not readily available in Australia. The number of shops that have non-toxic shot is limited and the only non-toxic ammunition currently available in Australia is manufactured by Winchester.

CO-ORDINATION

Although no special committee or working group has been established in Queensland, the Duck and Quail Advisory Committee, established to provide recommendations to the Minister for Environment and Heritage on the management of Queensland's duck

and quail harvest period has been working on issues concerning lead shot poisoning and the promotion to phase out lead shot for waterfowl hunting for several years.

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Australia, State of Victoria

Recreational duck hunting is permitted for approximately 3 months of the year (March-June). The bag limit is 10 birds on 8 species of duck. Hunting is a popular recreational activity with 25,000 licensed duck hunters. Numbers fell dramatically in the late 1980's from approximately 60,000 to 22,000 and have risen and stabilised at 25,000 currently.

It was estimated that prior to the phase-out of lead shot in Victoria, total prohibition in South Australia and limited ban on its use at certain sites in the Northern Territory, 350 tonnes of spent lead shot was deposited annually in Australian wetlands by duck hunters. It has been estimated that Victoria contributed approximately 170 tonnes to this total.

POLICY AND LEGISLATION

The use of lead shot for duck hunting is being phased out over a three-year period:

- 2000 - prohibited for use on all State Game Reserves
- 2001 - prohibited for use on all public land
- 2002 - prohibited for duck hunting throughout Victoria on all habitats

The phase-out of lead shot is a statutory requirement and any person failing to comply with the regulations may be prosecuted. The number of breaches will be monitored to indicate levels of compliance. In the first year of the phase-out, compliance was high with only three warning letters issued, and awareness of the regulations was excellent.

Large-scale enforcement efforts are conducted over the opening weekend of the season with ongoing efforts throughout the hunting periods. Officers are equipped with specialised metal detection devices (HOT*SHOTS) which reliably identify a range of shot types.

We are at the initial stages of the transition (year 1 of 3 years). As the prohibition is extended, the level of compliance will become more evident.

AWARENESS

Hunters are aware, but some sceptical, of the impacts of lead on the environment. The Department of Natural Resources and Environment, Victoria, has undertaken media and education campaigns to inform and educate hunters. Hunting organisations have also discussed the issue via publications and meetings.

Policy makers are also aware of the impacts of lead poisoning. This position is reflected in the Departmental policy and documents (e.g. legally binding Action Statement) and Government policy, including law.

A comprehensive education campaign has been delivered in conjunction with hunting organisations and the Victorian and New South Wales wildlife management agencies. All Victorian Game Licence holders endorsed for duck (approx. 25,000) and holders of New South Wales mitigation permits (approx. 3,000) were mailed a detailed booklet addressing a range of issues regarding the introduction and use of non-toxic shot. An inquiry phone line where Fact Sheets could be obtained and a website were provided for hunters.

Education will be ongoing during and after the transition to non-toxic shot is complete. Media releases from the Government and the Department have also been used to inform the hunting and general public.

The following extension materials have been made available to hunters:

- Booklet "Give Non-toxic a Shot, the Facts about Non-toxic Shot", 24 pp
- Website "Give Non-toxic a Shot" www.nre.vic.gov.au
- Fact sheets – eight sheets investigating in more detail aspects raised in the booklet
- "Duck hunting in Victoria", A4 information flyer
- "Victorian Hunting Guide", mailed to all Game Licence holders (31,000); includes up-to-date information on current laws and hunting conditions
- Several media releases
- Numerous articles in hunting magazines

Most of the above can be viewed at the website. Copies may be obtained from the Department of Natural Resources and Environment, Game Management Unit, 4/250 Victoria Parade, East Melbourne 3002, Victoria, Australia

RESEARCH AND DEVELOPMENT

- A number of scientific studies have been conducted
- One state discussion group
- One ANZECC Taskforce investigation (report included at website under "ANZECC Report")
- Regulatory Impact Statement

There is little manufacture and development of non-toxic ammunition in Victoria. Mostly ammunition is imported complete. Some manufacturers import components and assemble them in Australia.

CO-ORDINATION

Co-ordination groups:

- Victorian Duck Hunting Advisory Committee (disbanded)
- ANZECC Taskforce (Australia and New Zealand – disbanded)
- Victorian Hunting Advisory Committee – Non-toxic Shot Subcommittee (current, assisting in the delivery of hunter extension and advising the Department in aspects of regulation development)

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Austria

There is waterbird hunting with lead shot in Austria; its intensity varies seasonally and between locations. There is no policy or legislation concerning the use of lead shot.

RESEARCH AND DEVELOPMENT

The hunting association has initiated some research projects.

Ferstl, S. 1993. Untersuchungen zur Bleibelastung der Stockente (*Anas platyrhynchos*). Thesis Vet. Med. Universität Wien, Vienna, Austria

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Belarus

Hunting of waterbirds with lead shot only is widespread all over the country. It is one of the most popular forms of hunting in Belarus. The amount of lead lying in and around wetlands is considered to be medium, because of two reasons:

The amount of hunters is correlated with the total area of wetlands, which is small relative to other countries

When hunting waterbirds, Belarusian hunters use smaller amounts of shot than hunters in many other countries, due to the economical difficulties of the transition period.

Furthermore, most Belarusian wetlands have silt sediments, which lead shot rapidly sinks into, thus becoming inaccessible to birds. One can conclude that lead poisoning is not an important issue in Belarus so far.

POLICY AND LEGISLATION

The question of phasing out lead shot has never been raised.

AWARENESS

Policy-makers, scientists involved in investigation and conservation of wildlife, governmental officers working in the relevant fields, hunters, hunting societies, and other public nature protection societies are aware of the lead poisoning problem, which is shown by lectures, papers and presentations by scientists, and the publication *Wild Ducks of Belarus* by Y.A. Vyasovich (Vysheyshaya Schola, Minsk, 1973).

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Belgium (Flanders)

Waterfowl hunting with lead shot is forbidden in internationally protected areas in Flanders. Since 1993 there is a ban on the use of lead shot in Ramsar areas. In 1998 this ban has been extended to all EU Bird Directive areas.

Staff of the Administration of Environment, Nature and Land Development (ANIMAL) is responsible for implementation and follow up of hunting regulations, including the ban of lead shot in internationally protected areas. The ban on lead shot is however very difficult to investigate and control in the field because this ban applies to the use of lead shot and not to the possession of lead shot.

The present Minister of the Environment has recently proposed to prepare a total ban on the use of lead shot in Flanders, with positive advice of the Flemish High Hunting Council. This proposal and a concrete time schedule will be further discussed during the coming months.

AWARENESS

Nature and bird conservation bodies were the first to address the problem of lead poisoning but since 1992, this issue has also been recognised by the Flemish government and a lot of hunters. This has resulted in a ban of lead shot hunting in some areas.

RESEARCH AND DEVELOPMENT

- Devos K. & E. Kuijken, 1997. Lead Poisoning in waterfowl. 1997 update for Flanders (Belgium). Nota Instituut voor Natuurbehoud A.97.53, 2 pp., Brussels, Belgium
- Devos K., P. Meire, A. Anselin & E. Kuijken, 1998. Jacht op watervogels. Jacht in waterrijke gebieden. Bedenkingen en aanbevelingen van het Instituut voor Natuurbehoud. Nota Instituut voor Natuurbehoud A.98.72, 12 pp., Brussels, Belgium
- Devos K. & E. Kuijken, 2000. Lead Poisoning in waterfowl. 2000 update for Flanders (Belgium). Nota Instituut voor Natuurbehoud A.2000.122, 4 pp., Brussels, Belgium

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Bosnia Herzegovina

All hunters use only lead shot in Bosnia Herzegovina. There is no policy or legislation concerning the use of lead shot, nor have there been any research projects or education campaigns.

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Botswana

There is hunting of waterbirds in Botswana but it is concentrated in certain areas such as hunting concessions, some wetlands on or near private farms, and waterbodies used by sandgrouse (*Pterodes sp.*).

POLICY AND LEGISLATION

There are no statutory measures for the promotion of non-toxic shot. However, the current legislation has been looked at to see what the relevant instruments would be to make amendments. The relevant Minister has been advised by a special committee on matters of biodiversity operating under the Department of Wildlife & National Parks concerning an appropriate way to amend legislation to prevent the use of lead shot in some areas.

AWARENESS

There is an awareness among professional hunters and also among staff in the wildlife department, but it is not a widely publicised issue. General environmental awareness is raised through seminars and workshops organised by the committee on matters of biodiversity.

CO-ORDINATION

The committee on matters of biodiversity is looking into this issue, among others. However, we do not see lead poisoning as a major issue although clearly as no research has been done, we need to know more. Botswana is a large country with a low population, very low use of guns, and strong gun laws. Sport hunting by visitors from Europe, America etc. is the major shooting effort, with some private landowners also shooting for sport. Expatriate Chinese also shoot waterbirds in Botswana. Most hunters use snares and traps rather than guns.

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Brazil

There is hunting of waterbirds with lead shot in Brazil. There is no policy or legislation concerning the use of lead shot, nor have there been any research projects or education campaigns.

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Bulgaria

The Bulgarian questionnaire was returned just before the production of the report in August 2001. Therefore the answers could not be included in the analysis. So far the issue of lead poisoning has not been treated in Bulgaria. Hunting is a large scale matter, and all of it is still being done with lead shot.

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Cambodia

Hunting is a very small scale and sporadic activity in Cambodia. It is estimated that there is not a considerable amount of lead present in wetlands. Therefore, there is no policy or legislation concerning the use of lead shot, nor have there been any research projects or education campaigns.

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Cameroon

Hunting waterbirds is only allowed in the region Mayo Danai in northern Cameroon. There is no policy or legislation concerning the use of lead shot, nor have there been any research projects or education campaigns.

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Canada

Hunting with lead shot has been banned entirely since 1999. However, it is estimated that lead poisoning will remain a problem in the future due to large amounts of pellets still present in wetlands.

POLICY AND LEGISLATION

In 1991, Canada banned the use of lead shot in some "hot spots" across the country (places where lead-shot poisoning of waterfowl was known to be a problem). Non-toxic shot was required in National Wildlife Areas in 1996, in wetland areas in 1997, and has been required nationally for hunting most migratory game birds since September 1999. This ban has been carried out under the Migratory Birds Convention Act, which is a federal law. It was designed to help control the problem of lead poisoning of waterfowl by cutting down the amount of lead shot entering the environment by about 40%. Federal regulations do not deal with target shooting or hunting of terrestrial game birds and mammals, which are all covered by provincial laws.

In 1997, Canada also banned the use of lead fishing sinkers and jigs weighing less than 50 grams in its National Wildlife Areas and National Parks. This ban was carried out under the Canada Wildlife Act and the National Parks Act. New rules may be made to control the use of this type of fishing tackle (CWS 2001).

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Cape Verde

New laws are being prepared concerning conservation of natural resources in general. There is no policy or legislation concerning the use of lead shot, nor have there been any research projects or education campaigns.

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Chile

Hunting is not a large scale activity but since it is concentrated in some areas of the country, local intensities may be high. Lead poisoning is generally not considered a problem, although in some areas there may be a lot of lead present in wetlands. However, there is no information available about this. There is no policy or legislation concerning the use of lead shot, nor have there been any research projects or education campaigns.

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China

There is hunting of waterbirds with lead shot in China, but the scale is unknown. There is no policy or legislation concerning the use of lead shot, nor have there been any education campaigns.

There have been no publications specifically on lead poisoning in waterbirds, but some newsletters occasionally publish articles on the subject. Examples are:

*China Crane News
Newsletter for Wetlands
Newsletter of China Ornithological Society
Publication "Colonial waterbirds as bioindicators of pollutant levels and effects"*

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Congo

Hunting waterbirds does take place in Congo, but is not a large scale activity. This is due to the fact that hunting is concentrated in the north west of the country, where the population only engages in fishing and hunting mammals. Therefore, there is no policy or legislation concerning the use of lead shot, nor have there been any research projects or education campaigns.

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Croatia

Hunting is a large-scale activity in Croatia; there is no policy or legislation concerning the use of lead shot.

AWARENESS

A small campaign was launched by the Bird Protection Society in the early 90's. However, after the start of the war in Croatia, all activities ceased.

RESEARCH AND DEVELOPMENT

- Mikuska, J. (Publication about lead poisoning in waterfowl)
- Martinovic, D. (Publication about lead concentrations in fish tissues at fish farms)

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Cyprus

The hunting of wildfowl is not a particular problem in Cyprus. We have no or very few resident species of waterbirds. Our Shags are pelagic and we have very few breeding Mallard, Moorhen, Coot and Little Grebe. Our only resident species of wader are the Kentish Plover, Stone Curlew plus a very few Spur-winged Plover.

Most areas of open water are classified as Game Reserves. All our open stretches of water are Dams or Reservoirs with the exception of the 2 large Salt Lakes. No hunting is allowed over the Dams or the Salt Lakes. However, we do not have precise numbers. A great deal of illegal shooting does go on and many 'land birds' are shot over water.

Approximately 10% of the population are licensed to carry guns. The manufacture of lead cartridges is a large local industry. I very much doubt if they are even aware that a substitute for lead exists. The whole countryside must be heavily contaminated with lead shot. However, there is no indication that our large wintering population of waterbirds is in any way indirectly affected by shooting, and therefore poisoning of waterbirds by lead shot is not seen as a problem.

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Czech Republic

Waterbird hunting mainly takes place at locations with artificial breeding and releasing of mallards. According to Řehák (1999), the total amount of lead shot used in the Czech Republic in the period 1990-1998 is about 23 million, with an average weight of 31.22 g; i.e. approximately 718,060 kg. Considering the total area with waterbird hunting (170,000-250,000 ha), the average lead shot deposition is 0.029-0.042 kg/ha/year.

POLICY AND LEGISLATION

Goals set at the first conference on "The protection of littoral ecosystems at locations with intensive hunting of waterfowl" (1999) include: 1) To initiate the change from lead shot to steel shot at all Ramsar sites and all types of nature reserves within 10 years 2) Financial participation of the Ministry of Environment in this activity 3) To initiate partial change in ways of hunting waterfowl in order to decrease the amount of lead pellets falling into littoral zones of water bodies 4) To support grants from the Ministry of Agriculture (the body responsible for hunting in the Czech Republic) which enhance breeding possibilities of waterfowl 5) To support research of wetlands.

RESEARCH AND DEVELOPMENT

At the conference named above, the firm Sellier & Bellot presented the first results of the production and evaluation (possibilities, price) of steel shot. Short articles about the issue appeared in the hunters' magazine "Myslivost", including an article about the conference.

*Anonymous 1999 = Proceedings of the conference "The Protection of littoral ecosystems at locations with intensive hunting of waterfowl" held in Žďár nad Sázavou, Czech Republic, 22-23 April 1999. 122 pp (in Czech)

- Havelcová, E. and Havránek, F. 1999 [Real exposure of Mallards by lead shot] (summarised from final report for the Ministry of Agriculture). In: Anonymous 1999: 5-15
- Bukovjan, K. 1999. [The influence of lead on animals]. In: Anonymous 1999: 16-17
- Řehák, L. 1999. [The analyses of some components which influence littoral ecosystems by fall-out of lead shot]. In: Anonymous 1999: 60-109
- Urbánek, B. 1984. [How to continue with waterfowl hunting?] In: Pellantová, J. and Hudec, K. (ed.) 1984. [Waterfowl and its habitats in Czechoslovakia. Proc. Conf. Brno 37-57 (in Czech)]

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Denmark

Since April 1 1996 it has been illegal to use lead shot for all hunting in Denmark. Since that date it has also been illegal to sell lead shot. Since January 1 2000, it has also been illegal to possess lead shot. There are police controls to enforce this. However, there might be small-scale illegal use of lead shot.

We have no figures of the amount of lead still present in wetlands. However, we have not found any birds suffering from lead poisoning in the areas where a lot of lead shot were used before 1996.

RESEARCH AND DEVELOPMENT

In Denmark a private firm tried to develop a non-toxic type of cartridges based on pressed steelpowder, but it failed. We therefore use foreign non-toxic cartridges in Denmark.

CO-ORDINATION

The issue has been discussed in the Wildlife Management Council. A special group (authorities in co-operation with firearms dealers) has been set up in order to optimise non-toxic shot.

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Ecuador

There is hunting of waterbirds with lead shot in Ecuador. The scale is unknown. There is no policy or legislation concerning the use of lead shot, nor have there been any research projects or education campaigns.

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Egypt

There is hunting of waterbirds with lead shot in Egypt. There is no policy or legislation concerning the use of lead shot, nor have there been any research projects or education campaigns. However, the issue is mentioned in our annual instructions for hunters.

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Finland

The hunting of waterbirds with lead shot is illegal (Hunting Law 615/93 Par. 33). Police and hunting guards are annually checking that waterfowl hunters are using non-toxic shot. Any person using illegal hunting methods will be fined or sentenced to max. 2 years of imprisonment (Hunting Law 615/93 Par. 72).

AWARENESS, RESEARCH AND DEVELOPMENT

The effectiveness of various types of non-toxic shot have been widely tested (on target objects, e.g. gelatine) in order to be able to inform hunters on effective shooting methods (Magazine Metsästaja 4/2000). This magazine (Language: Finnish and Swedish; ISSN 0047-6986) has a circulation of 300,000 copies and contained many articles on this issue in the 1990's. A Lead Shot Committee composed a Report of Lead Poisoning in Waterbirds in Helsinki in 1992 (in Finnish).

- Björklund, A., Krogell, C., Osara, M., Soveri, T. & Vikberg, P, 1992: Lyijyhauilityöryhmä. –Työryhmämuistio MMM1992:6
- Ekman, K. 1991: Teräshauilit tulevat, miten reagoi metsäteollisuus. - Metsästaja 40 (5): 42-43
- Hänninen, P. 1996: Lyijyhauikieltoa noudatetaan: Vismuttia piipussa. – Metsästaja 45 (5): 44-46
- Insinööritoimisto PVS Oy 1989: Oulunsalon kunnan ampumaradan lyijypitoisuuksien selvitys.
- Kauppi, E. 1993: Myrkyttömät haulivaihtoehdot. - Metsästaja 41 (4): 10-11
- Lilja, K. 1996: Vismutti –vaihtoehto lyijylle. – Metsästaja 45 (2): 36-37
- Louhisola, P. 1991: Teräshauli tulossa meillekin? – Metsästaja 40 (4): 42-43
- Louhisola, P. 1992: Ammutko jo teräshaulein? – Metsästaja 41 (4): 38-39
- Louhisola, P. 1993: Teräs on kevyttä – käytä suurempia hauleja. – Metsästaja 42 (1): 47
- Louhisola, P. 1995: Viimeinen vesilinnustuskausi lyijyhaulein Suomessa. – Metsästaja 44 (4): 22-23
- Linden, H., Björklund, A., Krogell, C., Osara, M., Soveri, T. & Vikberg P. : Lyijyhauilit ja vesilinnut (Summary: Finnish review of lead poisoning in waterfowl). – Suomen Riista 38: 59-68
- MKJ 1996: Myrkyttömät haulit vesilinnustukseen (tiedotuslehtinen 6 s.)
- MKJ 2000: Metsästaja testaa vesilintupatruunat. – Metsästaja 49 (4): 8-9, 10, 12-13, 16-19.
- Niemelä, E.: Lyijyhauilit puhuttavat. – Metsästaja 41 (4): 3
- Nyman, C. 1989: Spridning av bly från skjutbanan i Jakobstad. – Naturvårdsbyråns i Jakobstad utredning.
- Pietiläinen, K. 1991: Lyijy ampumaradoilla. – Opetusministeriö: Ampumaradat ja ympäristö.
- Ripatti, J-P., Kauppi, E., Pohja, K. & Puurtinen, E: Varaudu ajoissa lyijyhauilien täyskieltoon. – Metsästaja 45 (3): 26-29.
- Soveri, T., Lindgren, E., Oksanen, A. & Hirvi, T. 1992: Joutsenten lyijymyrkytys (Summary: Lead poisoning in Swans). – Suomen Riista 38:56-59.
- Tanskanen, H., Kukkonen, I. & Kaija, J. 1990: Viikinmäen ampumaradan maaperän epäpuhtauksien selvittäminen.- Geologian tutkimuskeskuksen raportti.
- Vikberg, P. 1992: Vesilinnustuksessa teräshauilien käyttöön. –Metsästaja 41 (3): 58-59
- Vikberg, P. & Linden, H. 1991: Lyijyä vai terästä. Lyijyhauilien haitallisuus kiistaton. – Metsästys ja kalastus 1991 (7):54-55.

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France

Hunting is allowed between August 20 and February 10 in 21 Departments. There is a lot of hunting near wetlands (e.g. Camargue, Sologne, Brenne, Dombes, etc.).

The amount of lead present in French wetlands is rather large but lead pellets sink into the soft sediments until they reach a harder layer. The concentration in the upper 5-10 cm of the sediment (available to waterbirds) therefore depends on the wetlands soil nature and water management. Drying up also makes the sediment more compact and less penetrable, which slows down the pellet sinking rate. The concentration is therefore very variable.

POLICY AND LEGISLATION

The Ministry of Environment decided to ban the use of lead in wetland areas probably within 5-10 years. This decision was announced in Cape Town. Hunters and manufacturers take part in this development.

AWARENESS

Education campaigns are being developed at the moment. There have been many articles (in hunting magazines & technical literature) and a few TV documentaries about the issue, but some hunters are still not convinced that there is a problem. After the ban has been officially announced by the Ministry, the Federations of hunters will start an information programme for their members. The IWRB video on lead poisoning in waterbirds has been translated into French.

RESEARCH AND DEVELOPMENT

French research includes two experiments on the effects of lead pellet ingestion on Mallards. These projects were financed by ONC (National Hunting Office) and carried out by ONC in co-operation with the Nantes National Veterinary School; the results were published in two veterinary theses (in French). One study was financed by ONC and carried out by CNRS (National Centre for Scientific Research): an analysis of the effects of pellets ingestion on the survival of Mallards ringed in the Camargue at Tour du Valat, X-rayed and released in the 60/70's; a part of them were subsequently recovered. The results were presented at a seminar in Grado (Italy) last year; one publication is still in press.

Following a project led by ONC (test of ammunition) in co-operation with ammunition and arms manufacturers, one company has made some trials and is still working on it. The toxicity of the used material was tested and proved safe.

CO-ORDINATION

A working group composed of representatives of the hunting and sport shooting societies, arms and ammunition manufacturers, nature protection agencies, researchers and organisations addressing national and public affairs has been convened several times this year under the responsibility of the Ministry of Environment. The task of this group was to assess awareness of the lead poisoning issue, to promote communication between the parties concerned, and to suggest to the Ministry a timeline of measures preceding the ban on the use of lead shot in wetlands. The proceedings of the meetings of this working group should be presented soon to the Ministry of Spatial Planning and the Environment.

- Beck, N. and Granval P. 1997. Ingestion de plombs de chasse par la Bécassine des marais (*Gallinago gallinago*) et la Bécassine sourde (*Lymnocyptes minimus*) dans le nord-ouest de la France. *Gibier Faune sauvage, Game Wild* 14 (1): 65-70
- Duranel A., 1999. Effets de l'ingestion de plombs de chasse sur le comportement alimentaire et la condition corporelle du Canard colvert (*Anas platyrhynchos*). Ecole Nationale Vétérinaire de Nantes. Thèse pour le diplôme d'Etat de Docteur Vétérinaire
- Mézières, M. 1999. Effets de l'ingestion de plombs de chasse sur la reproduction du Canard colvert (*Anas platyrhynchos*). Ecole Nationale Vétérinaire de Nantes. Thèse pour le diplôme d'Etat de Docteur Vétérinaire

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Gabon

There is hunting of waterbirds with lead shot in Gabon. There is no policy or legislation concerning the use of lead shot, nor have there been any research projects or education campaigns.

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Gambia

We are not sure whether lead is used for hunting. However, lead is classified as a dangerous substance by the National Environmental Agency (NEA). Hence, under the National Environmental Management Act (NEMA) of 1994, it is illegal to dispose lead in the environment.

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Germany

A voluntary ban (recommendation) was established in 1993 by both the Federal Government and the hunters' association; according to this recommendation, only non-toxic shot should be used for waterbird hunting on wetlands. Hence, this recommendation did not cover sites other than wetlands.

There is no big discussion on the lead shot issue. There are, however, demands for a mandatory ban of lead shot on wetlands.

RESEARCH AND DEVELOPMENT

Several surveys of ducks, that were caught in large numbers, have been conducted. The aim was to quantify the amount of lead ingested by ducks. About 2-3% of ducks had ingested some lead shot. Most articles that appeared are compilations of research done in other countries (France, UK, USA). Some research is being done on secondary poisoning of raptors.

Manufacturers are still conducting research concerning the development of non-toxic shot.

CO-ORDINATION

In the period preceding the voluntary ban in 1993, there was a lead shot working group.

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Ghana

Hunting is not a large-scale activity in Ghana: it only takes place in a small number of wetlands. However, hunting is prohibited in the Ramsar Sites and irrigation areas. Species most affected are the ducks.

AWARENESS

If lead poisoning becomes a problem, awareness campaigns will be developed, targeted at lawmakers, law enforcement and the general public.

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Greece

Hunting of both birds and mammals is done only with lead shot in Greece.

POLICY AND LEGISLATION

The preparation of a new hunting law has been under discussion for a long time. However, no deadline or time schedule has been set.

RESEARCH AND DEVELOPMENT

There has been only one paper on this issue (Wildfowl (1990) Vol. 41: 163-170), dealing with only one wetland.

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Hungary

All small game hunting, including waterfowl hunting, is done with lead shot. There are 40,000 recreational hunters and ca. 3000 professional game managers.

Certain areas are heavily polluted, especially around areas with intensive waterfowl hunting.

POLICY AND LEGISLATION

There were some efforts by the nature conservation authorities to convert the use of lead shot to less toxic material, and even to ban the use of lead shot completely, but a large number of shotguns would have to be tested for use. Technology is at hand but conversion would cost hunters a considerable amount of money. Voluntary measures are therefore unlikely to happen. Non-toxic shot is not in use in Hungary.

AWARENESS

The problems are well known by nature conservation authorities, somewhat less known by hunting authorities and even less by hunters. So far no education campaigns have been planned.

RESEARCH AND DEVELOPMENT

Lead poisoning in waterbirds has been researched by a few scientists (see below). Nike, the main producer of lead shot in Hungary, was contacted about the possibilities of production of non-toxic shot. A discussion has been started with hunting organisations.

- Ákoshegi, I. 2000. Poisoning in waterfowl and pheasants due to lead shot in Hungary. *Aquila* (105-106): 47-58 (In Hungarian with English abstract)
- Sályi, G., Hilbertné, M.M. and Sztojkov, V. 1987. Lead poisoning in mallards (*Anas platyrhynchos*) due to lead shot. *Magyar Allatorvosok Lapja* 42: 621-626 (In Hungarian with English abstract)
- Hilbertné, M.M. 1982. Notes on lead poisoning in wild ducks. *Nimród Fórum* 1982 (június): 26 (In Hungarian with English abstract)
- Rásc Fodor, G. 1991. Lead poisoning in waterfowl. *Nimród* 111 (8): 16 (In Hungarian with English abstract)

CO-ORDINATION

No committee *per se* exists. However, in the framework of the Bonn Convention the Hungarian referent contacted a few people on this issue in the past.

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Iceland

Waterfowl hunting is not a large-scale activity in Iceland. About 10,000-12,000 hunting permits are issued each year, and of those only a minority is used for duck hunting. The bag sizes for the duck species hunted are as follows (1995-1999): Mallard 9,000-11,000; Teal 1,000-1,300; Wigeon 600-800; Scaup 100-230; Tufted Duck 70-460; Long-Tailed Duck 1,500-2,000 (shot at sea); and Red-Breasted Merganser (500-750). See the Wildlife Management Institute website: <http://www.veidistjori.is>

From this it can be concluded that the amount of lead shot spent is not significant compared to the area of the country. Geese are hunted in much greater numbers, but the majority of goose shooting takes place over grass fields and pastures where the lead is deposited in dry soils but not in wetlands.

AWARENESS, RESEARCH AND CO-ORDINATION

The Icelandic Hunting Association had a working group on lead shot which published an article in the association's magazine SKOTVIS (see below). The working group also held a public meeting on the issue.

The Wildlife Management Institute gives courses for hunters taking the hunting licence exam (necessary to get a permit). On these courses the issue of lead poisoning is discussed and hunters are encouraged to use alternative shot in wetlands.

- Einarsson, S.T., Haraldsson, H.Th. & Bjarnason, J. 2000. Blyhaglaskot og umhverfisvernd (Lead shot and environmental protection), SKOTVIS 6 (1): 61-63.

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India

All types of hunting are legally banned in India under the Wildlife Protection Act (1972) but a lot of poaching takes place in forests. Ducks are mainly hunted with nets.

AWARENESS

There is a lack of awareness of the issue. The Wildlife Protection Act, which is now under revision, is not effectively enforced in widespread wetlands.

CO-ORDINATION

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Iran

Lead shot is used for most geese and duck hunting. There is no policy or legislation concerning the use of lead shot, nor have there been any research projects or education campaigns.

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Ireland

Almost all hunting of waterfowl is done with lead shot, but only a small proportion of licenced game hunting is targeted on waterfowl. Most hunters hunt only terrestrial species; the hunting season is from 1st Sept.- 31st Jan. Lead poisoning has not really been discussed much in Ireland as it is perceived to be a minor problem (not a densely populated country, only small-scale waterfowl hunting). However, the problem has not been investigated properly.

POLICY AND LEGISLATION

The National Association of Regional Game Councils (NARGC, the main game hunting organisation), took a formal decision in October 1998 to commence discussions with the national Irish authority leading to a phasing out of lead shot in wetlands. These discussions have had to be abandoned due to a lack of interest from the State (NARGC).

The AEWA will be transposed into Irish law with a new Act which is before Parliament. However, the hunting community has decided not to cooperate and to resist the new law. This is because the Government has shown little interest in the safety issues which will arise from lead alternatives. Ireland closed down its Proof House some years ago (NARGC).

AWARENESS

Some hunters and policy makers are aware that lead shot can be ingested and cause lead poisoning, but it is thought to be a very minor problem generally.

RESEARCH AND DEVELOPMENT

Dr. John O'Halloran of Cork University has studied lead poisoning in Mute Swans, thought to be linked with lead fishing weights rather than lead shot. There have been some articles in hunting magazines over the last few years. Research of Dr. D Butler showed that of a total sample of 913 wildfowl gizzards, only 2.52% contained ingested lead shot (Irish Naturalists Journal, Oct. 1990).

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Israel

Hunting waterfowl is a small-scale activity, as is all hunting in Israel. Most of the wetlands are closed to waterfowl hunting altogether. Only very few hunters specialise in waterfowl. The hunting season is from 1 September to 31 January, with a daily bag limit of 10 birds per day (any combination). The following waterbird species are legal game in Israel: Mallard (*Anas platyrhynchos*), Teal (*Anas crecca*), Garganey (*Anas querquedula*), Northern Shoveler (*Anas clypeata*), Pochard (*Aythya ferina*), Tufted Duck (*Aythya fuligula*) and Coot (*Fulica atra*).

POLICY AND LEGISLATION

The current hunting by-laws actually state that one MUST hunt only with lead shot. This was actually intended to exclude the use of bullets from rifles but the wording now hampers the introduction of non-lead shot. This by-law is very old and we are in the process of trying to change it to allow and encourage and eventually legislate the use of non-toxic shot. This is still far off though. At this stage non-lead shot is not even available for sale anywhere in the country.

We are now in the process of switching our rangers over from using lead to non-toxic shot on an experimental basis when shooting foxes and jackals. Since these "pests" are usually left out in the field after being shot, there is a risk of lead poisoning in raptors. However, this is really a small-scale use of lead.

AWARENESS

Policy makers are convinced that the lead poisoning problem of waterfowl is minimal or even non-existent, but we are convinced that there does exist a real risk of lead poisoning to raptors, as mentioned above. The problem there is that non-lead shot is more readily available in the sizes needed for hunting fowl, and not jackals.

There is virtually no knowledge of this among hunters. No special education programmes have been planned, but they will be once we get to the point of instituting non-lead shot instead of lead.

After an incident in which an eagle was found dead from lead poisoning (apparently from ingesting lead pellets from a shot animal) there was a short article in the main daily newspaper a few months ago which addressed the intention of our agency (Israel Nature and Parks Authority) to start the switch to non-toxic shot.

CO-ORDINATION

There is one committee, made up of Dr. Simon Nemtzov (Wildlife Ecologist with Israel Nature and Parks Authority) and Ohad Hatzofe (a raptor specialist), which has prepared a working plan to introduce non-toxic shot in Israel. There is also an environmental toxicologist (Dr. Alan Schlossberg) who has looked into the entire issue of lead poisoning in Israeli wildlife; he is cooperating with the committee mentioned above.

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Italy

There is hunting of waterbirds with lead shot in Italy. There is no policy or legislation concerning the use of lead shot, nor have there been any education campaigns.

RESEARCH AND DEVELOPMENT

Cases of mortality (especially in swans) were reported in a few papers. Research by Elena Tirelli (rtinarelli@libero.it) included x-ray examination of waterbirds trapped during ringing activities, and shot counts in sample plots.

The production of non-toxic ammunition is inhibited by producers who presently hold the market and have a strong political power.

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Japan

There is hunting of waterbirds with lead shot in Japan. The amount of lead present in wetlands is rather large.

POLICY AND LEGISLATION

Under the national Wildlife Protection and Hunting Law, there is a national system of hunting regulations. One of those regulations, introduced during the hunting season of 2000/2001, concerns the designation of "Lead shot hunting prohibited areas" (i.e. hunting areas where non-lead shot has to be used). This is based on the amendment of "The 8th Wildlife Protection Project" (for the fiscal years of 1992-2001) of every (local) Prefecture Government in accordance with the amended Standard specified in 2000 by the Ministry of the Environment, formerly Environment Agency (until 6 January 2001). The amended Standard identified the necessity of designation of these "Lead shot hunting prohibited areas" in at least one wetland in each prefecture in the hunting season of 2000/2001. Some Prefecture Governments (10 out of 47 prefectures throughout the country) have designated more than one (up to 4) of such areas in the season.

The Ministry of the Environment has monitored the effectiveness of the designation of "Lead shot hunting prohibited areas", and the supply and use of non-toxic shot since the 2000/2001 winter. More effective enforcement is expected with the expansion of the number of "Lead shot hunting prohibited areas". In addition, the Ministry of the Environment has suggested future prohibition of lead shot in all wetlands in the country as soon as possible (e.g. Press Release on the designation of "Lead shot hunting prohibited area" in the country of 28 Sep 2000).

AWARENESS

The Environment Agency of Japan and the Japanese Hunters' Association jointly published an educational booklet (A5 size, 28 pages) and video for hunters on the use of non-toxic shot, titled "Let's protect birds from lead poisoning" in March 2000, and distributed to hunters throughout the country.

RESEARCH AND DEVELOPMENT

Some commercial companies in the country have developed soft steel ammunition. Other types of non-toxic ammunition have been imported. The Japanese Hunters' Association, with assistance from the Japanese Sport Shooting Ammunition Manufacturers' Association, has reviewed the efficient use of non-toxic ammunition in hunting.

CO-ORDINATION

The lead poisoning issue has been addressed under the "Wildlife Protection and Hunting Law" in the Wildlife Working Group of the "National Council on the Environment" of the Minister of the Environment.

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Kenya

There are only about two hundred licensed sport-hunters a year. Waterbird shooting is mainly considered by the sport-hunting community as a means of regulating numbers of waterbirds especially in places where they can be a nuisance to farmers.

The Firearms Department strictly controls the procurement of firearms. From the licensing office managed by the Kenya Wildlife Service it is estimated that only about 25% of those who obtain licences do any hunting at all. Of these most of the hunting is directed towards dryland gamebirds. Hunting of waterbirds using guns in Kenya is limited to only very few rich people. The cost of owning a firearm and purchase of ammunition in Kenya is already very high. This has forced sport hunters to be very economical in the way they use ammunition. Since there are very few and fairly inactive sport hunters the problem of lead shot could be negligible.

The general hunters' opinion is that non-toxic shot developed in America and Europe is less effective and expensive. If enforced in Kenya it may only kill the sport. The current costs and the stringent firearm procurement procedures have already marginalised sport-hunting activities.

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Kuwait

In Kuwait, the issue of lead poisoning in wetlands is not on the priority lists in the government plans. Yet, lead concentrations are being monitored on a regular basis in drinking water, air, suspended particles and soil. This is done for the sake of human protection.

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Latvia

Hunting waterbirds with lead shot does take place in Latvia. Ducks and coots killed annually:

1972	-	120,000 birds
1980	-	80,000 birds
1997	-	35,000 birds (MMD, 1999 (8), p.14)

At least 3-5 cartridges are needed to kill 1 bird.

POLICY AND LEGISLATION

Regulations of the Government:

On Nature Park of Lake Engure (Nr. 60/ 24.02.1998)

Article 11. In the nature reserve zone is prohibited:

...11.12.. use of toxic (containing heavy metals) shot during waterfowl hunting.

General Regulations on Conservation and Use of the Particularly Protected nature Territories (Nr. 354/21.10.1997) (Nr. 354/21.10.1997)

Article X. Transitional questions: Within 3 years after these regulations coming into force toxic (containing heavy metals) shot have to be replaced by non-toxic (not containing heavy metals) shot while hunting or control activities at nature reserves.

AWARENESS

National Programme on Biological Diversity: 16.1.5. Promote education of hunters in maintenance of biological diversity

Non-toxic shot is available in shops. However, no special studies have been carried out to monitor the extent of use.

RESEARCH AND DEVELOPMENT

- Articles in monthly journal "Medības, Makšķerēšana, Daba" (Hunting, Fishing, Nature):
 - Dundurs A. Pīļu patronas ar tērauda skrotīm [Cartridges with steel shot] MMD 1998 (9), p.17
 - Dundurs A. Šaušana ar skrotīm [Shooting with shot] MMD 1999(8), p. 17
- A small chapter in an encyclopaedia Lielā medību grāmata., Rīga, Jumava, 1999. (The Big Hunting Book)
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Lebanon

All major wetlands are extensively shot over with lead shot. Technically all hunting is illegal, but there is no enforcement.

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Liberia

There is no waterbird hunting with lead shot in Liberia; hunting with lead shot is mostly targeted at animals other than birds. There has been a ban on the import of all types of lead shot since the 1980 military coup in Liberia.

POLICY AND LEGISLATION

There are no voluntary or statutory measures to promote the use of non-toxic shot in waterbird hunting. However, there are general legislations to control hunting. These are specified in the new National Forestry Law of Liberia (chapter 9 section 9.2j). In addition, there are several wildlife regulations developed by the Forestry Development Authority, an Agency of Government responsible for the management of the nation's forests and natural resources.

There is no effective enforcement of the statutory measures, because of a lack of public awareness. However, Regulation No. 25 under the New Forestry Law addresses hunting law enforcement.

AWARENESS, RESEARCH AND DEVELOPMENT

At present, we are engaged with raising public awareness on biodiversity conservation in general. Plans are on the way to conduct wildlife research. We are therefore soliciting assistance from other institutions and organisations with the acquisition of logistics and the staff capacity in forest related fields, including wetland management.

CO-ORDINATION

There is a Division on Wildlife which co-ordinates activities regarding hunting; the issue of lead poisoning is not specifically addressed.

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Lithuania

There is no ban on the use of lead shot in Lithuania. However, in our opinion lead poisoning is not a problem because the hunting of waterbirds is restricted and not widespread. Therefore, there is no policy or legislation concerning the use of lead shot, nor have there been any research projects or education campaigns.

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Luxembourg

Hunting waterbirds is a fairly small activity in Luxembourg. The only waterbird declared as a game species is the Mallard (*Anas platyrhynchos*). About 2000 Mallards are shot each year. There have been some articles in national and international hunting magazines; in addition, the problem has been presented and discussed in the "Conseil Supérieur de la Chasse". However, most members are convinced that lead poisoning in waterfowl is not a real problem in our country. Therefore, there is no policy or legislation concerning the use of lead shot, nor have there been any research projects on this issue.

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Malawi

Hunting is a very small-scale activity in Malawi. There are probably only 2000-3000 shotguns in the country. There is no policy or legislation concerning the use of lead shot, nor have there been any research projects or education campaigns.

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Malaysia

Only one species (White-breasted Waterhen) is allowed to be hunted during the open season from 1st October until 31st December. It is only a small-scale activity.

POLICY AND LEGISLATION

Guidelines for hunting waterbirds have been established. Regular monitoring and enforcement efforts are conducted by the wildlife rangers throughout the country during and after the hunting season. Additional hunting regulations and handling methods are stated in the hunting licenses. Additional strict regulations and restricted hunting ground will be developed.

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Mali

In the Interior Niger Delta, 62,605 waterbirds were killed in 1999 versus 17,077 in 2000. Hunting with lead shot is most popular in the Djenné area.

POLICY AND LEGISLATION

Although there are laws for hunting in general, there are no rules for the use of non-toxic shot.

AWARENESS

Especially in villages and schools where Wetlands International is active, awareness programmes are mainly focused on the sustainable hunting of waterbirds in general.

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Hunting of waterbirds mainly takes place at sea or around the coast. Some small-scale waterbird hunting takes place in a few valleys where dams hold the rain water during some months. In Malta there are only two small wetlands, and hunting is prohibited there. However, a considerable amount of lead must be lying all over the countryside. There is no policy or legislation concerning the use of lead shot, nor have there been any research projects or education campaigns.

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Mauritania

Hunting waterbirds is not a large-scale activity in Mauritania, but since the climate conditions have returned to normal in 1998 it has been of increasing importance, concerning both waterbirds and non-waterbirds.

POLICY AND LEGISLATION

The Hunting Laws prohibit the use of toxic ammunition both for large game hunting, which was banned in 1975, and for sports hunting.

There are no measures taken explicitly for the monitoring of non-toxic shot. However, the general hunting ban and the spatial and temporal restrictions on hunting waterbirds, as well as the rules set by the hunters' association, which is responsible for potential infractions, are aimed to discourage the use of toxic shot.

It is difficult to assess whether legal measures are effectively enforced, since the responsible authorities lack the people, materials and finances necessary for monitoring the laws.

The hunting of migratory and waterbirds is authorised by a Decree issued by the Minister of the Environment in which the duration, 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 interlocutor between the Administration and the hunters, and responsible for all illegal acts. The Administration cannot monitor hunting activities in wetland areas open for controls (Lac d'Aleg, Lac de Mâle) during the hunting season because of a lack of available resources. 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.

CO-ORDINATION

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. This project has not yet received financing.

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Moldova

In Moldova there is a lot of hunting with lead shot. Concerning the problem of heavy metals, including the lead poisoning problem, work was done by the Moldavian Institutes of chemistry, ecology and zoology of the Science Academy. Over the last decades there has been a substantial reduction in the number of birds, in particular *Aythya nyroca*. Also, in 1994, ducks in the river Prut were reported to have lost their ability to fly. No special research has been conducted, but we can suppose that the reason for this could be lead poisoning.

The problem seems to be acknowledged by scientists, but not by hunters. Some general information has been published concerning the amount of lead in wetland areas, but only concerning rivers, where there are relatively few birds. There is some concern about poisoned fish being harmful to humans.

Lead poisoning is possibly a serious problem in Moldova, but we cannot deal with it because of a lack of funds. There is a possibility for us to receive funding from Tacis CBS Project Facility (a programme of the European Union which "supports new states in their efforts to establish partnerships, connections and networks for the exchange of knowledge and expertise", *EU 2001b*) for a research programme on the avifauna of the lakes of the Lower Pruth, possibly including the issue of lead poisoning. However, we are still trying to come into contact with a person from a Western European country who would be willing to co-ordinate this project for us.

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Monaco

The lead poisoning issue is of no importance in Monaco. Monaco comprises a town of 35,000 inhabitants, and its surface area of 2.2 square kilometres is entirely urbanised.

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Morocco

Hunting waterbirds is a relatively small-scale activity, which does not pose a threat to waterbirds. Out of a total of 31,000 licences issued during the 1999/2000 hunting season, only 907 were waterbird hunting licences. Therefore, there is no policy or legislation concerning the use of lead shot, nor have there been any research projects or education campaigns.

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Namibia

Lead shot is bought in large quantities in Northern Namibia, in the Caprivi region. Hunting is not commercially organised, but only for local gain. There is no policy or legislation concerning the use of lead shot, nor have there been any research projects or education campaigns.

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The Netherlands

The use of lead shot has been banned in The Netherlands since February 1993. Possession of lead shot in the field is also illegal. However, illegal use is sometimes reported. The enforcement of this ban is carried out by the police; a hunter's licence will be suspended in case of an offence. The ban is now generally accepted by the hunting community, since there are good alternatives available at a comparable cost.

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Norway

All use of lead shot for hunting ducks, geese and waders has been banned since 1991. The Directorate of Nature Management has for a number of years advocated a total ban on all use of lead shot starting in the year 2000. This was to happen through a voluntary agreement with the national hunters' association. However, this voluntary ban has after 10 years still not been implemented, since many hunters seem reluctant to change to alternatives. The Ministry of Environment, in collaboration with the Directorate for Nature Management and the Directorate for Pollution Control, recently agreed to draft a regulation on the total ban on the use of lead shot. The regulation will include a ban on the production, import, selling and use. The Ministry aims to discuss the new regulations early next year, and it is expected that the ban will come into effect in three to five years' time. A ban on the use of lead pellets on clay target shooting fields is not considered controversial and may be implemented later.

AWARENESS

Much information has been provided by the Directorate for Nature Management through annual leaflets provided to all hunters. The Directorate closely co-operates with the hunters' association.

RESEARCH AND DEVELOPMENT

The veterinary college performs annual surveys on death causes in animals by analysing corpses. The benefits, dangers etc. of non-toxic shot have been discussed in annual information booklets from the Directorate.

CO-ORDINATION

The co-ordination group was dismantled after the ban in 1991. Work on the new regulation banning all lead shot is now performed by the State Pollution Board Authority.

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Peru

Peru is now elaborating the new hunting regulations in its legislation of wildlife conservation and management. There is no policy or legislation specifically concerning the use of lead shot, nor have there been any research projects or education campaigns.

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Romania

Lead shot is the only type of shot available in Romania. There is no policy or legislation concerning the use of lead shot, nor have there been any research projects or education campaigns.

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Russia

Hunting waterbirds (with lead shot) is a large-scale activity, especially in a few particular regions of Russia. On the Kolyma and Abyi Lowlands, for example, a high occurrence of lead shot ingestion in waterfowl has been recorded.

POLICY AND LEGISLATION

Generally, in Russia there is no legislation to restrict waterbird hunting with lead shot. However, one region in the far north-east of Russia, Yakutia, does have hunting regulations concerning wetlands. In Yakutia, there is an increasing number of areas where hunting is restricted. In 1996, a law on development of nature reserves was issued. According to this law, 25% of Yakutia, including many wetlands, became a nature reserve. The period of duck hunting is now restricted in these areas. In problem regions we are planning to redistribute lead from lakes to the large rivers. We suppose that lead shot sinks into the river bottoms quickly and will thus become less accessible to birds. We are searching for technologies to redevelop polluted lakes, and we would appreciate to receive information on this from other countries.

AWARENESS

In Russia the level of awareness on this issue is low. We need to carry out special education programmes for the population and for hunters. However, the lead poisoning issue has been addressed in the lecture course for students of the Russian Agriculture University for the last 5 years (ecology and game-biology specialities). In Yakutia, there have been media/education campaigns about the lead poisoning issue. Hunters seem to be willing to use non-toxic ammunition and to attempt to restrict hunting in wetlands.

RESEARCH AND DEVELOPMENT

In 1973 we began to study lead poisoning in birds in Yakutia: the regions polluted by lead shot were identified, intensity of lead pollution was determined on some lakes, and lead shot ingestion and lead poisoning incidents were registered. In 1995, blood lead levels of eiders were screened. In Yakutia lead shot was recorded in gizzards of *Anas acuta*, *Aythya marila*, *Aythya fuligula*, *Bucephala clangula*, *Anas crecca*, *Polysticta stelleri*, *Somateria fischeri*, *Melanitta deglandi*, *Cygnus bewickii*, and *Grus leucogeranus*. On the Kolyma and Abyi Lowlands, a high occurrence of lead shot ingestion in waterfowl was recorded. High concentrations of birds in the problem areas may be causing their high losses from lead poisoning.

In 1998-2000 gun cartridges with non-toxic shot have become available.

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Annual numbers of waterfowl hunted in Slovakia are relatively small. Numbers for 1999 were 20,970 mallards (*Anas platyrhynchos*), 570 grey geese and 518 coots (*Fulica atra*). This means that the total amount of lead from shot should be small as well. An average of three shot shells is needed for one successful hit; the average amount of lead shot per shell is 30 grams. This results in an annual lead deposition in wetlands of 22 000 (specimen of waterbirds hunted per year) x 0,03 (average amount of lead shot in kilograms) x 3 (average amount of shot per one successful hit) = 1980 kg.

Because lead poisoning is not considered a problem, there is no policy or legislation concerning the use of lead shot.

Prior to signing the AEWAs, the Slovak Republic requested dispensation for the admonition to ban lead shot for waterbird hunting by the year 2000. This dispensation was granted because of acknowledged political (financial, logistical) reasons (*AEWA, pers. comm.*).

RESEARCH AND DEVELOPMENT

So far, research has not been considered necessary, because there has been no evidence of any lead poisoning of waterbirds in Slovakia until now. However, the Forest Research Institute is planning on carrying out research next year aimed to find out whether lead shot is present in the intestines and stomachs of huntable game species of waterbird.

There is no producer of non-toxic ammunition in Slovakia.

Some information materials were published in magazines for hunters.

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South Africa

Waterbird hunting (with lead shot) is a growing activity in many parts of South Africa. The intensity varies on a provincial level, but overall it probably occurs on a small-medium scale. There seems to be greater interest in gamebird hunting, although there seems to be an upward trend in wingshooting. According to the Wingshooters Association of South Africa (WASA) less than 500 hunters per year regularly hunt waterfowl at or near wetlands. An increase in waterfowl hunting may, however, lead to an increase in lead shot at certain wetlands.

Based on the limited amount of waterbird hunting that takes place in South Africa, there is, overall, probably a negligible amount of lead shot in and around wetlands. According to WASA, the majority of waterfowl hunting takes place on flight routes or at feeding grounds (e.g. croplands etc.) and not near wetlands.

Many wetlands in South Africa have muddy bottoms and any lead shot falling into the water would become inaccessible to most waterbirds, except large species which either dive and/or feed on the bottom (e.g. grebes, some ducks and large waders). Thus, few birds would be able to have access to the shot even if the bottoms were hard or sandy. Being insoluble, lead shot would

also not pose any threat to the environment. The only concern would be the lead shot lying around wetlands, which could be far more accessible to a larger range of birds and could potentially pose a problem. Of far more serious concern is the uncontrolled release of soluble lead and other heavy metals by industry which is absorbed biologically and is accumulated in body tissues.

POLICY AND LEGISLATION

There is only one provincial nature reserve (Mpumalanga) where lead shot is phased out. There are voluntary measures in the form of articles in SA Wingshooter magazine and lectures conducted under the auspices of the National Gamebird Federation and AGRED. In these articles and talks, members are encouraged not to hunt waterfowl at or near wetlands.

Alternative forms of shot (e.g. steel, tungsten, tungsten polymer and bismuth) are either not available and/or up to ten times more expensive than lead shot. Given the current workload of our law-enforcement staff it is unlikely that legislation requiring use of alternative more expensive non-toxic shot could be enforced. However, the Poison Working Group is currently investigating the possibilities, and is encouraging authorities and hunters to start using non-toxic shot.

AWARENESS

There is probably very limited awareness, although through voluntary measures mentioned above, a large proportion of hunters/wingshooters may be made aware of the threats of hunting at or near wetlands with lead-shot. There seems to be the perception that there is no problem, due mainly to the small-scale utilisation of waterfowl at or near wetlands. There is also a disbelief in the potential threats of lead to birdlife.

RESEARCH AND DEVELOPMENT

The only known study (van Eeden et al. 1994) has been an investigation of toxic metals in two waterbird species in South Africa. This study revealed insignificant levels of lead in the breast muscles of the species examined. Unfortunately, no further details of this study are available but the National Gamebird Federation will be contacted to request a copy of the paper.

A National Gamebird Federation Committee has identified the possible impact of lead poisoning as one of its priority national research projects. Parameters they intend investigating include the extent of lead poisoning, sources of lead poisoning, uptake of lead pellets by birds, digestion of lead derivatives, etc. However, due to lack of funds this research remains pending.

Several alternative shot types have been tested (e.g. bismuth) and produced, but the cost will be approximately seven-ten times higher than lead shot production. There is also the concern regarding the impact of bismuth mining on the environment.

- Van Eeden, P.H., Adendorff A., Schoonbee H.J. 1994. The occurrence of potentially toxic metals in breast muscle of two aquatic bird species. Paper delivered at the 2nd South African Gamebird Symposium.
- Van der Westhuizen R. 1999. Hard facts about steel. SA Wingshooter. 2: 14-15.

CO-ORDINATION

The Poison Working Group is gearing up a programme on this issue.

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Spain

A decree exists for the elimination of lead shot during the hunting season in wetlands. In July 2000, this decree was approved by the National Commission for the Protection of Nature (a co-ordination unit between the Ministry of Environment and the Autonomous Communities. Subsequently this decree was sent to the appropriate Authorities for their approval. The project consists of the banning of lead in hunting and sporting activities in wetlands which are on the Ramsar List.

The text of the decree was drafted by the Department of Nature Protection after a study on the impact of the use of lead in some Spanish wetlands. This study was undertaken in 1992; other studies were undertaken afterwards.

The Autonomous Region of the Balears has abolished the use of lead during the hunting season. The law 9/1997, dated 26 May, modifies Art. 36 of Hunting Law 2/1993, adding the ban on the use of lead or other toxic ammunition for hunting wild animals.

The Parliament of Cataluña urged in Resolution 783/V of 19 November 1998 to establish the necessary measures to substitute lead by non-toxic materials. The use of bismuth (recently brought on the market) could be an alternative.

The Autonomous Regions of Andalucía and Valencia are also planning to take measures.

- Mateo, R., Belliure, J., Dolz, J.C., Aguilar-Serrano, J.M. and Guitart, R. 1998. High prevalences of lead poisoning in wintering waterfowl in Spain. Archives of Environmental Contamination and Toxicology 35 (2) 342-347

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On June 1, 2001 the Spanish government approved a ban on the use of lead shot by hunters in the country's principal wetland areas in response to a long-standing demand by environmental NGO's to end a practice responsible for massive poisoning of aquatic birds. The measure takes effect in October and applies to 38 areas covered by the international Ramsar wetlands protection convention.

The environment ministry estimates that 30-50,000 aquatic birds die annually due to ingestion of lead pellets, including large numbers of emblematic endangered species such as the white-headed duck. Official figures indicate that hunting results in 5,000 tonnes per year of lead being deposited in protected natural habitats.

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Sri Lanka

The hunting of birds is prohibited by the Fauna and Flora Protection Ordinance (FFPO) in Sri Lanka. Yet there is an unestimated amount of illegal hunting with lead shot. The FFPO is being amended at present. The Act already bans hunting. Therefore effective enforcement is the next step to be taken.

AWARENESS

Three education campaigns have been organised on this issue: The impacts of illegal hunting, Lead and causes of lead poisoning, and Impacts of water pollution.

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Sultanate of Oman

There is no hunting of waterbirds with lead shot in the Sultanate of Oman. Therefore, there have not there been any research projects or education campaigns.

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Sweden

Formally, hunting of coot and common snipe (and woodcock) is still allowed. But as there is a ban on the use of lead shot covering all ducks and geese, this hunting is considered to be a small scale activity.

Due to lack of resources, the legislation is not effectively enforced. Random samples are taken by the Coast Guard and the Police. Hunting of waterbirds is hardly a large scale activity in Sweden and therefore the hunting pressure is fairly low.

The government has declared its intention to enlarge the ban to include terrestrial habitats as well.

AWARENESS

The issue is frequently discussed in hunting magazines and there seems to be a general acceptance among hunters about the link between waterbird hunting and lead poisoning.

RESEARCH AND DEVELOPMENT

Birds found dead are frequently analysed with respect to toxic residues.

The ammunition manufacturer Gyttop has developed alternatives to lead shot (steel or tungsten), which are well adapted to European shotguns to a relatively low price (steel: £ 6.8 per 25 cartridges, tungsten £ 0.8 - 1 each).

A completion has been done within Swedish EPA:

- Kajland, A. 1995: Lead in Shotgun Cartridges and Possible Substitutes. Swedish EPA, 8 pp (mimeogr.)

CO-ORDINATION

There is no formal committee or group, but temporary co-operation prior to the compilation of information leaflets.

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Switzerland

Apart from some large lakes waterbird hunting is not a very large-scale activity.

POLICY AND LEGISLATION

In the federal ordinance on hunting and protection of wild mammals and birds (see the website <http://www.admin.ch/ch/d/sr/9/922.01.de.pdf>) a ban on the use of lead shot in shallow-water areas and wetlands ('Flachwasserzonen und Feuchtgebieten') was introduced on 1 April 1998. The term "Wetlands" is not used in the sense of the Ramsar convention and means mires and marshes. The Cantons have to designate the areas falling under the two terms.

RESEARCH AND DEVELOPMENT

- Zuur, B. (1982): Zum Vorkommen von Bleischrotkörnern im Magen von Wasservögeln am Untersee. Ornithol. Beob. 79: 97-103

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Thailand

Hunting waterbirds (with lead shot) is mainly practised to protect the rice harvest from being eaten by birds. This is going to be a large-scale activity if we are not able to solve this problem.

Lack of monitoring and law enforcement is the main problem in Thailand; in addition, Thailand approved a new constitution in 1997 which gives local people the right to protect, manage, conserve etc. their resources.

AWARENESS

The Bird Conservation Society of Thailand is going to organise education campaigns about the lead poisoning issue. There have been a few publications on this issue.

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Togo

There is no hunting of waterbirds with lead shot in Togo. Section X of the Environmental Code and the Decree Nr. 4 of January 16, 1968, defines the general hunting regulations in Togo. On behalf of the Fauna and Hunting Department of the Ministry of Environment and Forest Protection, terrain managers enforce these regulations. Technical personnel monitors all organised hunting.

The Ministry of Environment and Forest Protection is planning on updating the decrees regarding the policy towards flora and fauna protection.

AWARENESS

Education campaigns have raised better awareness and knowledge of waterbirds and their habitats among the target audience. Regular surveys of waterbirds have been conducted.

CO-ORDINATION

A national network was established in Togo in 1999 which is responsible for the policy regarding wetlands and the survey of waterbirds. This network has a national co-ordinator.

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Uganda

Officially, no hunting is allowed in Uganda. Illegally, small-scale hunting takes place, mainly for sitatunga (a species of antelope), but also some waterbirds.

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Ukraine

Currently, there are about 450,000 hunters in Ukraine, versus 550,000 in the 1980's. All of them use only lead shot. In some popular wetlands, high densities of lead shot were recorded already in the 1970's and 1980's. In some places of the Kiev Reservoir (on the river Dniepr), lead pellet densities reached up to 60 lead pellets per square meter. Lead shot was also found in the gizzards of waterbirds (e.g. *Fulica atra*, *Anas platyrhynchos*, *Aythya ferina*).

In the 1980's, 700 tonnes of lead shot were sold annually through the network of hunting shops which belong to the Ukrainian Hunters' and Fishermen's Society. This is only part of the total amount of lead shot used by hunters.

POLICY AND LEGISLATION

There are no restrictions in our legislation regarding the use of lead shot. On the contrary, there is a quite strong opposition, including the Ukrainian Parliament, against changing from lead shot to other types of shot.

AWARENESS

Generally, hunters don't see lead shot as a problem. The issue is not discussed in the media. However, at the level of NGO's there have been some publications in newspapers, a TV programme and some discussions with state organisations. There have been attempts to develop simple methods of identifying lead in samples from wetlands; it has been suggested that this should be carried out in school projects.

RESEARCH AND DEVELOPMENT

There have been a few minor publications on this issue, mainly related to the Kiev and Kanev Reservoirs (big artificial water bodies on the river Dniepr).

Several years ago the Ukrainian National Academy of Science has developed technology for producing steel shot, adopted to Ukrainian conditions/industry. The documentation was passed on to the Ministry of Environment and Natural Resources, but nothing happened.

- Golovach, O.O. 1986. Ecologically safe steel bullets for hunting and sport shooting – magazine *Metal I Litye v Ukraine* (Metal and Casting in Ukraine), #7-8, p. 28-29
- Golovach, O.O. 1994. Ecological Ricochet – newspaper *Zelenyi Svit* (Green World), #6/70/1994, p.4
- Golovach, O.O. 1994. Autumn Nutrition and Lead Poisoning of Game Ducks in the Dniepr Reservoirs – *Limnology and waterfowl monitoring, modeling and management*, Abstracts, p. 20, Sarrod-Sopron, 21-23 Nov. 1994
- Golovach, O.O. 1996. For Ducks – magazine *Ukrains'kyi Lisovyi I Myslivs'kyi Zhurnal* (Ukrainian Forest and Hunting Magazine) #2, p. 28-29
- Golovach, O.O. 1999. The problem caused by Lead Poisoning in waterfowl in Ukraine and ways of solving it – *Today's condition and perspectives of development of natural sciences in Ukraine*, Kyiv, p. 51-54
- Karavayev, A.A. 1990. Condition of Swan Wintering in the SE Pricaspian Region – *Ecology and Conservation of Swans in the USSR*, part 2, Melitopol, p. 19-24
- Koshelev, A.I. 1990. Death causes of the Mute Swan in the Northern part of the Black Sea – *Ecology and Conservation of Swans in the USSR*, part 2, Melitopol, p. 108-111

CO-ORDINATION

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United Arab Emirates

There is no hunting of waterbirds with lead shot in the United Arab Emirates.

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United Kingdom, general

The United Kingdom has moved to a system of devolved Government and hence each of the devolved countries (England, Northern Ireland, Scotland and Wales) have different methods of resolving this issue. The contributions of each of the devolved countries are given below.

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United Kingdom, England

England banned the use of lead shot over wetlands in 1999 (Statutory Instrument 1999 No. 2170: Restrictions on the use of lead shot; Environmental Protection, England). This statutory ban was preceded by a voluntary phase-out of lead shot. The measures are effectively enforced by the police.

AWARENESS

Awareness has been raised through publications in hunting magazines, campaigns organised by the hunting organisations, press releases when the ban was initiated, and questions in the Parliament.

RESEARCH AND DEVELOPMENT

A research contract between the government and the shooting organisations failed.
Private ammunition manufacturers have done research regarding the development of non-toxic shot.

CO-ORDINATION

Before the statutory ban, there was a lead shot working group in addition to a lead shot main forum. There has been a lead shot legislation review group since 1999.

Address: see above

United Kingdom, Northern Ireland

Hunting waterbirds is a large-scale activity in Northern Ireland. A voluntary ban on the use of lead shot has been in place for a number of years, and a statutory ban, which will be effective 1 September 2001, was introduced in 2000. Northern Ireland participated in a U.K. working group, and has participated in general U.K. publicity campaigns.

Address: see above

United Kingdom, Scotland

Currently there is a voluntary ban on the use of lead shot. An actual ban is in place on one National Nature Reserve (Caerlaverock) and on Local Nature Reserve (Eden). From October to December 2000 there was a consultation period in Scotland on a proposal to restrict the use of lead shot.

Address: see above

United Kingdom, Wales

A voluntary agreement not to use lead shot over wetland areas has been in place since 1995. The BASC Code of Good Shooting Practice encourages use of non-toxic shot over wetland areas. Some shooting of waterbirds with lead shot may still take place, but small-scale. Regulations are being considered. Possible regulations to prohibit the use of lead shot over specified areas and for shooting certain bird species are being considered by the National Assembly for Wales. If agreed, it is likely that regulations will come into force in September 2001.

CO-ORDINATION

A meeting was held by the Assembly for Wales with interested parties in July 2000.

Address: see above

United States of America

The use of lead shot was phased out in the United States in the 1980's culminating in a complete ban on the use of lead shot for hunting waterfowl in 1991. Additionally, there are prohibitions for using lead shot for hunting terrestrial game in the vicinity of wetland habitats.

POLICY AND LEGISLATION

There have been a number of independent studies conducted that have demonstrated a reduction in the lead shot available to birds since the regulations were put into effect. Additionally, some studies have suggested that the mortality of waterbirds from lead poisoning has been significantly reduced.

There is a strict enforcement of the regulations by state and federal law enforcement officers throughout the country. There is a strong belief that there is good compliance with the regulation, particularly since the availability of alternative non-toxic shot beyond steel.

There are continuing studies of lead poisoning focused on terrestrial birds and habitats and should evidence suggest that this is a problem, additional regulations may be considered. Additionally, there have been bans on the use of lead sinkers and other fishing gear where this has proven to be a problem with waterbirds such as loons.

AWARENESS

There was a significant public information campaign during the phase in period for the regulations in the 1980's and early 1990's. Additional campaigns on lead shot are not expected. However, a campaign has been started on the issue of lead sinkers in fishing and will continue for the foreseeable future in areas where this is known to be a problem.

RESEARCH AND DEVELOPMENT

Relevant research and information

- Anderson, W.L., S.P. Havera, and B.W. Zercher. 2000. Ingestion of lead and non-toxic shotgun pellets by ducks in the Mississippi Flyway. *J. Wildl. Manage.* 64(3):848-857.
- Simpson, S.G. 1989. Compliance by waterfowl hunters with non-toxic shot regulations in central South Dakota. *Wildl. Soc. Bull.* 17:245-248.
- Havera, S.P., W.L. Anderson, and S.G. Wood. 1989. Use of blood from dead mallards to monitor lead poisoning. *Wildl. Soc. Bull.* 17:241-244.
- Sanderson, G.C. and F.C. Bellrose. A review of the problem of lead poisoning in waterfowl. *Ill. Nat. Hist. Surv. Spec. Publ.* 4. August 1986.
- Rocke, T.E., C.J. Brand, and J.G. Mensik. 1997. Site-specific lead exposure from lead pellet ingestion in sentinel mallards. *J. Wildl. Manage.* 61(1):228-234.

Development of non-toxic ammunition

There are currently a number of non-toxic shot alternatives available for hunting waterbirds in conjunction with wetlands, including steel, bismuth-tin, tungsten-iron, tungsten matrix, tungsten polymer, and tin. Some of these only have temporary approval until the full battery of toxicology can be performed. Steel shot is the most widely available, most widely used, and

cheapest (usually \$0.40/shell). The other non-toxic shot are more expensive and not as widely available currently. Price and availability varies on these other shot types (often \$1.85/shell). Each manufacturer has put out some material to promote the shot-type. The US Fish and Wildlife Service requires supporting documentation and research that supports the claim of non-toxicity.

CO-ORDINATION

The International Association of Fish and Wildlife Agencies has established a subcommittee to look at the issue of toxicity in terrestrial game bird hunting, especially doves.

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Zimbabwe

Hunting waterbirds is a small-scale activity in Zimbabwe. There is no policy or legislation concerning the use of lead shot. There seems to be no awareness of the issue among hunters, but an article will appear in *African Hunter* in the near future to alert locals to the developing situation. The difficult political situation in the country has been reported to delay plans to alert hunters and gun shops on this matter.

- Mundy, P.J. 1995. New moves for African migratory waterfowl. *Honeyguide* 41: 210-217

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Asia-Pacific Migratory Waterbird Conservation Strategy

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Appendix V: List of useful Internet sites

Conventions, Agreements and Organisations:

- AEWA: <http://www.unep-wcmc.org/aewa>
- Asia-Pacific Migratory Waterbird Conservation Strategy:
<http://www.environment.gov.au/water/wetlands/>
<http://www.wetlands.org/waterbirdstrategy>
- CMS: <http://www.wcmc.org.uk/cms>
- Council of Europe: <http://www.coe.int/> and <http://conventions.coe.int/>
- European Union and European Commission: http://europa.eu.int/index_en.htm
- FACE 2001: <http://www.face-europe.org>
- OECD 2001: <http://www.oecd.org>
- Ramsar: <http://www.ramsar.org>
- UNEP: <http://www.unep.org>
- Wetlands International: <http://www.wetlands.org>

Lead Poisoning; Non-toxic shot:

- Canadian Wildlife Service: <http://www.cws-scf.ec.gc.ca/>,
linkto <http://www.cws-scf.ec.gc.ca/pub/hunting/toxic.html>
- Environment Canada: <http://www.pnr-rpn.ec.gc.ca/index.en.html>
- NRE Australia: <http://www.nre.vic.gov.au/>, linkto recreation&tourism; hunting; non-toxic shot; fact sheets
- Remington: <http://www.remington.com/AMMO/PAGES/Shotshell/steelselect.htm>
- Report by Scheuhammer & Norris (1995): <http://www.cws-scf.ec.gc.ca/pub/ops/op88/home.html>