

Flora & Fauna Guarantee Action Statement

#32

This Action Statement was first published in 1992 and remains current. This version has been prepared for web publication. It retains the original text of the action statement, although contact information, the distribution map and the illustration may have been updated.

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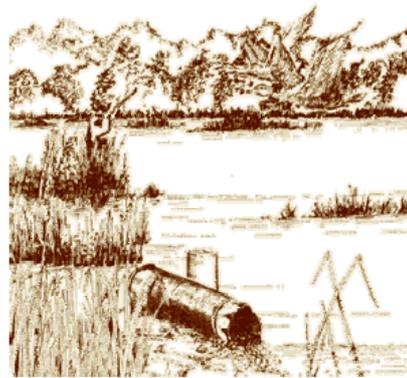
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The use of lead shot in cartridges for hunting waterfowl



(Illustration by John Las Gourgues)

Description and Distribution

Lead shot has been widely used in cartridges to hunt game ducks for many years. The amount of lead in each cartridge varies with the load and size of pellets. Each cartridge may contain approximately 30 to 45 grams of lead.

The Department of Conservation and Environment (DCE) estimates that 190 tonnes of lead was deposited in wetlands open to duck hunting in Victoria in the 1990 season and 235 tonnes in the 1991 season. These estimates were based on extrapolations from surveys of hunters from an estimated hunter base of 25 000. These estimates correlate with the volume of lead shot sold to hunters by Winchester (Australia) (B. Burns pers. comm.). In the 1980s, when duck hunting in Victoria was at its peak of popularity, lead shot deposition would have been much greater than the figures for 1990 and 1991. Sharley *et al.* (1992) estimate that hunters deposit 350 tonnes of lead annually in wetlands, Australia-wide. This lead is not deposited

evenly over the estimated 15 000 wetlands in Victoria, many of which are open to duck hunting during the open season. Wetlands most at risk of excessive lead deposition are those most popular with hunters. For example, in years that it carries water, Lake Buloke has had up to an estimated 10 000 hunters pursuing game ducks on opening weekend. Other wetlands popular with hunters also receive significant deposits of lead in the form of spent lead shot. The lead shot does not readily degrade and deposits continue to accumulate in wetlands as more lead is discharged during hunting. Lead is not quickly released in the environment and so does not accumulate in water or vegetation (Lund *et al.* 1991), but remains in the sediment where it may be ingested by waterfowl or other birds. Therefore, the effects from lead shot could be expected to become more common and more acute if the use of lead shot for hunting waterfowl continues.

Conservation Importance

"The use of lead shot in cartridges for the hunting of waterfowl" has been listed as a potentially threatening process in Schedule 3 of the *Flora and Fauna Guarantee Act* 1988.

Reasons for Listing as a Potentially Threatening Process

The Scientific Advisory Committee (SAC) (1992) in their final recommendation determined "The SAC is satisfied that DCE has shown that lead poisoning is occurring in Victoria waterfowl at levels that are of considerable concern overseas and may be lethal in the long term. The process may threaten the survival of a range of species in Victoria, given the range of waterfowl that use wetlands at which duck hunting occurs."

The SAC were satisfied that two criteria for listing as a potentially threatening process were met. These were:

- that the potentially threatening process, in the absence of appropriate management, poses or has the potential to pose a significant threat to the survival of a range of flora or fauna; and
- the potentially threatening process poses or has the potential to pose a significant threat to the survival of two or more taxa.

The range of flora and fauna affected by the potentially threatening process consists of waterfowl which feed in or on the edges of wetlands, especially deep-diving ducks, and predators such as the Whistling Kite (*Haliastur sphenurus*), Swamp Harrier (*Circus aeruginosus*) and White-bellied Sea-Eagle (*Haliaeetus leucogaster*) (SAC 1992).

Evidence relevant to the issue of lead poisoning as a potentially threatening process comes from Victorian, interstate and international sources. Much of this evidence is outlined below.

The ingestion of lead shot affects mainly diving ducks such as Blue-billed Ducks (*Oxyura australis*), Musk Ducks (*Biziura lobata*) and dabbling ducks such as Pacific Black Duck (*Anas superciliosa*), but could affect all waterbirds and fish that ingest lead shot, as well as scavengers and predators eating these species, e.g. birds of prey or the Tiger Quoll (*Dasyurus maculatus*).

While no major outbreaks of lead poisoning in Victorian waterfowl have been reported, this does not mean that it has not occurred. Affected birds tend to be secretive and predators and scavengers remove dead or dying birds (Friend 1985). Two Musk Duck collected from Lake Boort in 1989 were diagnosed to have died from lead poisoning, possibly from lead shot fired from a shooting range at the edge of the lake. Sharley *et al.* (1992) report that nine species of Australian waterbirds have been recorded with ingested lead shot in their gizzards. The ingestion of only one lead shot pellet may be sufficient to kill a bird (Pain & Rattner 1988).

At Bool Lagoon, in South Australia, lead poisoning of Magpie Geese (*Anseranas semipalmata*) (Harper & Hindmarsh 1990) and Black Swans (*Cygnus atratus*) (Koh & Harper 1988) has been reported. Whitehead & Tschirner (1991) have recorded high levels of lead poisoning of

Magpie Geese in wetlands in the Northern Territory. Lead poisoning in waterfowl has been recorded in 21 countries (Pain 1992). Studies in North America (Bellrose 1959; Anderson 1975; Longcore *et al.* 1974), France (Hoffmann 1960; Hovette 1972), Denmark (Clausen & Wolstrup 1979) and England (Mudge 1983; Spray & Milne 1988) have also reported lead poisoning of waterfowl following ingestion of spent lead shot. Lead poisoning of avian species other than waterfowl have also been reported (Locke & Friend 1992). Non-waterbird species known to have been poisoned by ingested lead shot include doves (Lewis & Legler 1968), quail (Stoddard 1931; Campbell 1950) and birds of prey (Pain 1991).

Sanderson & Bellrose (1986) and Pain (1990) conducted a review of the more recent literature and showed that the amount of shot ingested varies with the feeding habits of different species. They also stated that the diet of waterfowl may influence the toxic effect of ingestion of lead shot and that mortalities which take place after the ingestion of one or two pellets may be overlooked since the affected birds tend to be secretive.

Waterbirds take up particles of grit to aid in digestion. Spent lead shot may be taken up by waterbirds along with grit or incidentally with food. When this occurs there is exposure to lead and potential lead poisoning. Depending on a number of factors, including the number of lead pellets ingested, there may be chronic poisoning, one characteristic of which is a considerable weight loss before death, or acute poisoning in which death occurs quickly without weight loss. Not all birds die. Of those that do, death can be up to three weeks after ingestion of lead pellets.

Because of concern about the potential for lead poisoning DCE undertook a study of lead levels in waterfowl in 1990. Hunters provided DCE with the wings of game birds taken over the opening weekend of the 1990 duck season. In addition, DCE collected gizzards and livers from a number of species, including protected birds, to test for the presence of lead. As the birds were collected on the opening weekend of the 1990 duck season, lead present in the bones, gizzards and livers reflected exposure to lead from previous hunting seasons. Wickson *et al.* (in press) reported on this study. They examined a total of 250 gizzards and found that 30 contained ingested lead pellets, many of which were worn smooth. This represents the minimum rate of exposure to lead shot, because of the timing of the sampling (the start of the season) and because lead shot is quickly ground in the gizzard and dissolved as lead salts and absorbed by the bird (Friend 1985). Examination of Pacific Black Duck collected from Lake Buloke found 14.4% with ingested lead pellets and thus the potential for lead poisoning. This indicated levels in excess of one of the criteria (where more than 5% of birds sampled have lead shot in their gizzards) considered in North America to warrant the change to non-toxic ammunition. Wickson *et al.* (in press) also found 4.6% of Pacific Black Duck had lead concentrations in their livers higher than the concentration accepted in North America as being elevated. This is close to the level (5% of a sample) which warrants the change to non-toxic ammunition in North America. This 5% criterion would probably be exceeded early in the hunting season when newly deposited lead was available. They also found that lead concentrations were

elevated in the bones and livers of small samples of diving ducks. Their conclusion was that the potential for lead poisoning was avoidable through the use of non-toxic shot. Waterfowl are not the only animals susceptible to poisoning from spent lead shot. Predators and scavengers are also at risk of lead poisoning through eating lead-affected individuals. Lead poisoning of the Bald Eagle, which is endangered in North America, was a major reason for the introduction of legislation banning the use of lead shot in the USA. No Australian studies are available, but examples of Australian species potentially at risk include Wedge-tailed Eagle (*Aquila audax*), Whistling Kite, Swamp Harrier, Brown Falcon (*Falco berigora*) and the Peregrine Falcon (*Falco peregrinus*). There are regular reports of these species showing symptoms of lead poisoning (N. Mooney pers. comm.).

In its final recommendation the SAC (1992) has determined that the use of lead shot in cartridges for the hunting of waterfowl is a potentially threatening process as in the absence of appropriate management it:

- poses or has the potential to pose a significant threat to the survival of a range of flora and fauna;
- poses or has the potential to pose a significant threat to the survival of two or more taxa.

Major Conservation Objective

To eliminate, within three years, additions of lead shot to Victoria's wetlands and, thereby, reduce the potential for lead poisoning of Victorian fauna.

Management Issues

At present, the only commercially available form of non-toxic shot in Victoria is steel shot. Should other non-toxic shot (such as bismuth) become commercially available its use for duck hunting will be considered.

The major management issue with steel shot is convincing hunters to use it rather than lead shot, for hunting legal game species of waterfowl. Considerable misinformation, mainly generated by the North American change from lead shot, has been disseminated on all aspects of the issue. Enforcing regulatory changes is also likely to be a major management issue.

Some hunters argue that lead shot should be banned on a wetland by wetland basis, when each wetland is shown to have significant levels of lead shot available to waterfowl. These hunters are generally opposed to a state-wide ban on lead shot in duck hunting within the three year period announced by the Minister for Conservation and Environment on 8 January 1992.

Mudge (1992) looked at alternatives to non-toxic shot, including land cultivation, management of water levels and provision of grit. He concluded that there are a variety of possible means of alleviating the seriousness of lead shot poisoning problems for waterfowl. However, a switch to the use of non-toxic shot is, in general, the only demonstrably effective and long-term solution to the problem. Other approaches offer, at best, the prospect of restricted and temporary amelioration. In most cases there is insufficient field evidence of their effectiveness. Certain

approaches may have a role in specific circumstances, but they do not form a viable, generally applicable, substitute for a switch to non-toxic shot. Sharley *et al.* (1992) concluded that in the long term a substantial reduction in the risk of lead ingestion and poisoning can only be achieved by the banning of lead shot.

Ecological Issues Specific to the Threatening Process

Spent lead shot from duck hunting accumulates in the sediment in wetlands. Waterfowl are highly mobile and may move to and from wetlands with significant deposits of lead shot. Those species particularly susceptible to lead poisoning may become poisoned even though they may only spend a small portion of the year in polluted wetlands. In addition, some species could quickly ingest fatal doses of lead shot even on wetlands with low densities of shot.

Therefore, a ban on the use of lead shot only on selected waters will still expose waterbirds to potential lead poisoning. Based on 1990 and 1991 figures, if 50% of hunters were permitted to use lead shot cartridges, then over the next ten years between 950 and 1175 tonnes of lead would be deposited in wetlands. Wetlands open to the use of lead shot may have a greater pressure from hunters and hence more lead deposited than they currently receive.

Areas Where Threatening Process is not Operating

There are no areas currently available for hunting of waterfowl where the threatening process is not operating.

Wider Conservation Implications

Other animals at risk of poisoning from ingested lead shot could include species of fish or native predators. The threatened species potentially at risk include:

- Magpie Goose
- Blue-billed Duck
- White-bellied Sea-Eagle
- Tiger Quoll

In light of the implementation of this action statement, other sources of lead deposition into wetlands needs to be investigated. In particular, the siting of clay target shooting ranges needs to be scrutinised in areas where there is a possibility for there to be a discharge of lead shot into wetlands. These ranges are not confined to a specific season as is duck hunting and have the potential to be the source of substantial amounts of lead being deposited in wetlands.

Social and Economic Issues

Although no attitudinal surveys have been undertaken, opinion on this issue seems strongly divided. Considerable negative publicity, mainly generated by the North American change from lead shot, has been widely circulated. The Game Management Unit will produce information leaflets and conduct hunter education programs to ensure hunters have access to the latest, accurate information.

There will be some short-term difficulties for hunters during the introduction of steel shot cartridges:

- the increased cost of steel shot cartridges when compared to lead shot cartridges (currently \$17-25 for steel compared with \$8-12 for lead; this price

- differential is expected to decrease as the use of steel shot increases as was the case in the USA);
- steel shot has different ballistic properties from lead shot requiring hunters to alter their shooting action and to generally use a shot size two sizes larger than the size of lead shot they have been using (ie 4's instead of 6's);
- not all shotguns are suited to the use of steel shot; and
- misinformation regarding steel shot is currently being circulated.

Duck hunters spend a significant amount of money in pursuit of their recreation. A limited study undertaken by DCE (Brown 1987) suggested that each hunter spent on average approximately \$375 in 1987. The amount each hunter spends on hunting ducks would be expected to increase after the phase-out of lead shot due to the increased cost of steel shot. However, the experience in South Australia was that hunters used fewer cartridges when they switched from lead to steel shot (L. Best pers. comm.) so the overall cost of ammunition may not increase. For most hunters, the increased cost of steel shot is relatively small compared to all costs of duck hunting and would be a maximum of 40 cents per cartridge, based on current prices of \$7 per box for lead shot and \$17 per box for steel shot. This price differential is expected to decrease as the use of steel shot becomes more widespread. In South Australia, the price of a box of steel shot cartridges fell from \$20 per box in 1991 to \$17 in 1992.

Hunters who own a shotgun not suited to the use of steel shot would need to purchase a new gun suitable to fire steel shot, at a cost upwards from approximately \$500. The experience in North America has been that 5% of hunters own a firearm not suited to the use of steel shot (T. Roster Pers. Comm.). A similar percentage in Victoria would equate to 1250 hunters. Shotguns not suitable for use with steel shot could still be used for target shooting or for species other than waterfowl.

The shooting skills of hunters vary greatly. The more skilled the hunter is, the less shots are fired at ducks. Since steel shot has different ballistic characteristics from lead, hunters will have to learn to shoot with steel shot to achieve good results.

The social costs to society in the form of lead shot discharge into Victoria's wetlands and the subsequent potential poisoning of our waterfowl are difficult to quantify. The consequences of not acting on this issue would be to place some species at risk of potential lead poisoning. Combined with other factors, such as loss of habitat, there is the possibility that species particularly vulnerable to lead poisoning may be placed at risk.

Veterinary reports on two Musk Duck collected from Lake Boort indicate they died as a result of lead poisoning. The source of the lead was probably a clay target shooting range nearby. The siting of these establishments needs to be carefully planned and scrutinised. Ducks that die as a result of lead poisoning or are taken by predators in a weakened state are not available for hunters. Therefore, hunters might be affected by reduced numbers of those game species

susceptible to lead poisoning if lead shot use was to continue unchecked. In addition, a decline in populations of some non-game species is possible.

The issue of employment within the firearm ammunition industry is important, with major manufacturers producing millions of lead shot cartridges annually. They have the opportunity to commence production of steel shot cartridges during the three year phase-out. Manufacturers will still produce lead shot cartridges to be used for hunting animals other than ducks and for target shooting.

Management Action

Previous Management Action

In North America, legislation has been introduced banning the use of lead shot for all waterfowl hunting by 1992 and replacing it with steel shot (Pain 1991), which is non-toxic to waterfowl when ingested. Canada requires non-toxic shot in certain areas (Wendt & Kennedy 1992), and Denmark is moving to a general ban on the use of lead pellets (Clausen 1992). In Australia, South Australia is phasing-out the use of lead shot for hunting waterfowl. This process will be completed by 1993 (Sharley *et al.* 1992).

In the USA, the International Shooting and Hunting Alliance (ISHA) asked the National Academy of Science (NAS) in 1988 to review the scientific evidence for the US Fish and Wildlife Service's phasing-out of lead shot for waterfowl hunting. The NAS reported to the ISHA that there was no basis for questioning the evidence for lead poisoning of waterfowl and Bald Eagles, nor was there any basis for questioning the appropriateness of the actions of the Service based on that evidence.

There have been a number of lawsuits in the USA with respect to non-toxic shot regulations. Anderson (1992) reports on eight court cases, four of which involved appeals, that had direct bearing on the implementation of non-toxic shot regulations in the USA. There were ten unsuccessful challenges to the non-toxic regulations. In one such case, the Californian Fish and Game Commission sued the Federal Government in 1987 over the proposed implementation of non-toxic shot regulations. The court determined that the Federal Government did have the power to impose the regulations and further concluded "...that the Federal Government had ample evidence of lead poisoning in waterfowl and endangered species in California and elsewhere in the United States" (Anderson 1992). This decision was upheld on appeal.

Feierabend (1985) reported that the American courts have consistently accepted scientific evidence that lead poisoning is a problem in waterfowl populations, and they have consistently rejected arguments that steel shot is ballistically inferior to lead shot, cripples excessively, and damages firearms.

In Victoria, previous management action has involved monitoring the effects of lead shot in wetlands (Wickson *et al.* in press). Examination of wing bones and livers of some diving ducks and Pacific Black Ducks indicated higher concentrations of lead. The Northern Territory has banned the use of lead shot in selected waters.

Intended Management Action

- Consult with hunting organisations and DCE Regions to determine in which wetlands the use of lead shot cartridges for hunting waterfowl will be prohibited in 1993.
- Prepare regulations to:
 - Prohibit the use of lead shot cartridges for duck hunting on selected public wetlands open to duck hunting in Victoria, commencing in the 1993 duck season.
 - Prohibit the use of lead shot cartridges for duck hunting on the remainder of Victoria's wetlands by the 1995 duck season.
 - Prepare a Regulatory Impact Statement on the proposed regulations to allow for public consultation.
 - Undertake a hunter education program to counter the misinformation about steel shot currently circulating.
 - Inform the community and educate and train hunters on the use of alternative shot.
 - Train DCE staff on the use of alternative shot and enforcement of non-toxic shot regulations.
 - Investigate the use and suitability of alternative non-toxic shot.
 - Continue to conduct annual surveys of duck hunters and use the results to determine the amounts of lead entering wetlands in 1992, 1993, and 1994.

Other Desirable Management Actions

- Survey hunters as to their attitude to the use of steel shot for hunting waterfowl.
- Survey hunting organisations, social clubs and gun clubs as to their attitude to the use of steel shot for hunting waterfowl.
- Liaise with ammunition and firearm manufacturers and suppliers regarding phasing out the use of lead shot cartridges for hunting waterfowl.

Legislative Powers Operating Legislation

Flora and Fauna Guarantee Act 1988: provides legal powers for the protection of the State's native flora and fauna.
Wildlife Act 1975: controls research, management and taking of protected wildlife.
Wildlife (Game) Regulations 1990: control the taking and possession of protected wildlife declared to be game species.

Licence/Permit Conditions

To hunt waterfowl in Victoria legally, a person must have a current Gamew Licence authorising him/her to hunt game birds including duck. This endorsement is only given to

applicants who have passed the Waterfowl Identification Test run under the direction of DCE.

In addition, to possess, use or carry a firearm, a person must carry a Shooter's Licence issued by the Victorian Police, or any equivalent interstate Shooter's Licence.

Consultation and Community Participation

A number of groups have been consulted with regard to the phase-out of lead shot. These include:

- Animal Liberation
- Australian Conservation Foundation
- Australian Deer Association
- Bird Observers Club of Australia
- Conservation Council of Victoria
- Greenpeace
- Royal Australasian Ornithologists' Union
- Royal Society for the Prevention of Cruelty to Animals
- Shooting Sports Council of Victoria
- Sporting Shooters Association of Australia
- Victorian Field and Game Association
- Victorian National Parks Association
- Victorian Wetlands Trust
- Winchester (Olin) Company

A Regulatory Impact Statement is being prepared and will be released for public comment prior to the release of new regulations regarding replacing lead shot with non-toxic shot for duck hunting in Victoria.

Implementation, Evaluation and Review

Lead shot will be phased out over a three year period. The success of this phase-out will be evaluated. The Game Management Unit will evaluate:

Hunter compliance with Regulation	every year
Hunter response to Regulation	every year
Lead levels in waterfowl	end of three years

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Further information

Further information can be obtained from Department of Sustainability and Environment Customer Service Centre on 136 186.

Flora and Fauna Guarantee Action Statements are available from the Department of Sustainability and Environment website: <http://www.dse.vic.gov.au>

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