COMPLIANCE WITH THE ENVIRONMENTAL PROTECTION (RESTRICTION ON USE OF LEAD SHOT)(ENGLAND) REGULATIONS 1999

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Report to Defra from the Wildfowl & Wetlands Trust with contribution from the British Association for Shooting and Conservation



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EXECUTIVE SUMMARY

1. Background

As a response to the issues of lead poisoning in wildlife and as a Contracting Party to the African Eurasian Waterbird Agreement (AEWA), the UK is committed to phasing out the use of lead shot over wetlands (AEWA 1999, 2002, 2008). The Environmental Protection (Restriction on Use of Lead Shot) (England) Regulations were introduced in England in 1999 (as amended 2002 and 2003) with an aim of protecting waterfowl from unnecessary mortality and morbidity from lead poisoning and to help the UK meet its obligations under AEWA. In 2008, Defra commissioned this 18 month study to assess compliance with the Regulations.

2. Aim and methodology

An assessment of level of compliance with the Regulations and reasons for this was made by:

- a) identifying shot types from ducks purchased from game suppliers across England in two shooting seasons (2008/09 and 2009/10)(hereafter referred to as 'game dealer survey'); and
- b) conducting questionnaire surveys of two key stakeholders groups i.e. shooting participants, through British Association for Shooting and Conservation (BASC) members and a shoot providers survey (hereafter referred to as 'BASC member survey' and 'shoot provider survey' respectively).

3. Summary of game dealer survey findings

Non-compliance with the Regulations was high and widespread across English Government Office regions with 70% of ducks (344/492) overall having been shot with lead.

Despite the relatively high profile of lead issues and knowledge of the research being in the public domain e.g. via the shooting press, there was no significant difference in level of non-compliance between the two shooting seasons.

A significantly higher proportion of Mallard (Anas platyrhynchos) had been shot with lead than Wigeon (A. penelope) and Teal (A. crecca) (337/459, (73%) vs 2/20 (10%) and 5/13 (38%), respectively). This could reflect non-compliance mainly in inland game and/or duck shooting activities as coastal wildfowlers are known to supply game outlets only rarely (however the small samples sizes of Wigeon and Teal should be noted).

Although not an offence, 73% of game suppliers sold ducks containing lead shot.

4. Summary of findings from the questionnaire surveys

BASC member survey: Overall, precise understanding of the specifics of the Regulations was poor but understanding of the 'spirit' of the Regulations was good i.e. if members complied with what they understood the Regulations to mean, this would, by

default, mean that they complied with the Regulations as they would be 'over-applying' rather than 'under-applying' the Regulations and potentially using non-lead where they could legitimately use lead.

Of those legally obliged to use non-lead, 45% indicated that they sometimes or never comply with the Regulations.

Over a third of those who should be using non-lead disagreed with the reasons behind the Regulations and the Regulations themselves. The main reasons for disagreement were: perception that lead poisoning was not a sufficient problem to justify the Regulations; the Regulations were the start of phasing out lead shot; the Regulations were not enforced; and the non-lead alternatives were expensive, not widely available and not as effective as lead.

Shoot provider survey: Similarly, precise understanding of the Regulations was relatively poor but understanding of the 'spirit' of the Regulations was good. Shoot providers' understanding of their legal responsibilities was relatively good and 55% (234/426) reported making compliance a requirement at the beginning of shoots. Attitudes towards the Regulations were similar to those of BASC members.

Overall: The widely held belief that lead poisoning is not a sufficient problem to justify the Regulations may be related to lead poisoning being an 'unseen disease' and shooters rarely seeing at first hand the individual effects and scale of mortality.

Efficacy and cost of non-lead alternatives remain contentious and there is a clear role for shooting organisations and manufacturers in increasing their efforts to address these issues.

Despite relatively good understanding of the 'spirit' of the Regulations, there was concern from respondents that the Regulations were confusing, and more information and guidance was requested.

Accepting that many find the reasons behind the Regulations to be unjustified and perceive them as 'a means by which to begin phasing out lead shot', and the Regulations themselves are thought too complex and difficult with which to comply, and additionally unenforced, it is not surprising that a relatively high proportion of those who should be using non-lead indicate that they do not always comply.

5. Suggestions to improve compliance

For more than ten years BASC and other NGOs from the shooting and conservation communities have worked to raise awareness of the issue of lead poisoning of waterfowl from the ingestion of spent lead shot, the Regulations in England and the need for waterfowl shooters to comply with them. However, as this current study has demonstrated, level of compliance in some sectors, probably those primarily reflecting inland duck shooting, remained low. Based on the findings in this report the following suggestions to improve compliance are made:

a. Continued persuasion

The results of this study should be publicised to the shooting community together with the potential implications of continued non-compliance. Awareness should be raised of the problem of lead poisoning for waterfowl and of the Regulations themselves. Although the main focus should be on inland game and/or duck shooting activities, all situations where the Regulations apply should be included. The provision of information and guidance on the efficacy, cost and availability of non-lead alternatives and changes in shooting behaviour that need to be made, should be continued and enhanced.

b. Enforcement or ensuring compliance

Enforcement

Defra should investigate issues surrounding enforcement of the Regulations and reporting of offences should be encouraged.

Ensuring compliance by not permitting non-compliance within the shooting community

Reporting of offences by shooters to shoot providers should be encouraged and shoot providers should ensure, by whatever means, that they are making compliance a requirement of participation and not causing or permitting noncompliance.

Game dealers could be encouraged to demand of their suppliers that ducks are shot legally.

c. Other options

It is requested that Defra and, where appropriate, the newly formed Lead Ammunition Group, examine the options for improving compliance with, and thereby the effectiveness of, the Regulations for the benefits of waterfowl in England. This should include examination of the options listed above and others, such as working with the ammunition manufacturers and suppliers to address issues of efficacy and cost of non-lead alternatives, and other changes in the legislation likely to result in appreciably improved compliance.

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CHAPTER 1

INTRODUCTION

Compliance with the Environmental Protection (Restriction on Use of lead shot) (England) Regulations 1999

1 INTRODUCTION

1.1 BACKGROUND

Wildlife is exposed to lead via sources such as fishing weights, leaded paint, mining and smelting activities, but by far the greatest exposure comes from spent ammunition, mainly spent gunshot (Scheuhammer & Norris 1995; Wetlands International 2000; Mateo 2009). Waterfowl and terrestrial game birds mistakenly ingest spent cartridge shot in place of the grit needed to aid digestion of food within their muscular gizzard (Hall & Fisher 1985; Butler et al. 2005; Potts 2005). In waterfowl, the disease is an important cause of mortality and negatively affects productivity (e.g. Bellrose 1959; Pain 1996; O'Connell et al. 2008; Mateo 2009). It is a particular problem in dabbling ducks, diving ducks and grazing species (Mudge 1983; Pain, 1990a, 1990b, 1992; Sharley et al. 1992) and accounts for an estimated 8.7% of waterfowl mortality in Europe (Mateo 2009). In an analysis of causes of mortality in adult swans in Britain between 1951 and 1989 (Brown et al. 1992), lead poisoning was found to be responsible for 21% (55/264) of deaths, the second greatest cause of mortality after flying accidents which in itself can be related to lead toxicity (Mathiasson 1993; Kelly and Kelly 2005).

1.2 LEGI SLATI VE CONTEXT

As a response to the issues surrounding lead poisoning in wildlife, legislation to restrict use of lead shot has been introduced in countries across the world. The use of lead is banned for waterfowl hunting in the USA and Canada and a number of European countries and banned completely in four European countries (the Netherlands, Denmark, Norway and Sweden). Appendix 1.1 summarises the legislation in place in Europe.

Several multilateral environmental agreements have responded to the risk in relation to lead ammunition (as reviewed by Wetlands International 2000). As an example, the UK as a Contracting Party to the African Eurasian Waterbird Agreement (AEWA) is committed to phasing out the use of lead shot over wetlands (AEWA 1999, 2002, 2008).

1.2.1 Legislation in England

Within a UK context, a four year voluntary phase-out of use of lead for shooting over wetlands was introduced by the Government in 1995. Post-devolution this was then followed by introduction of the Environmental Protection (Restriction on Use of Lead Shot) (England) Regulations 1999, Statutory Instrument 1999 No. 2170 (HMSO 1999).

The aim of the Regulations was to protect waterfowl from unnecessary mortality and morbidity from lead poisoning and to help the UK meet its obligations under AEWA.

Section 3 of the Regulations state that:

No person shall use lead shot for the purpose of shooting with a shot gun -

(a) on or over any area below high-water mark of ordinary spring tides;

(b) on or over any site of special scientific interest included in Schedule 1 to these Regulations; or

(c) any wild bird included in Schedule 2 to these Regulations.

Schedule 1 contains wetland SSSIs identified for their (inter)national waterfowl importance. The Amendment in 2003 (HMSO 2003) removed four of the listed SSSIs but included another.

Schedule 2 included all species of Anatidae (ducks, geese and swans), Coot (Fulica atra), Moorhen (Gallinula chloropus), Golden Plover (Pluvialis apricaria) and Common Snipe (Gallinago gallinago). The Amendment in 2002 (HMSO 2002a) removed the last two species.

Section 5(1) of the Regulations 1999, states:

Any person who contravenes [the Regulations] or causes or permits another person to contravene [the Regulations] shall be guilty of an offence and shall be liable on summary conviction to a fine not exceeding level 3 on the standard scale.

Thus those with responsibility for a shoot e.g. a shoot provider should avoid undertaking any acts that could result in an offence being committed under Section 3, and/or once that person is aware that someone may commit an offence under Section 3 they should take reasonable steps to not permit this non-compliance.

A review of these regulations was due in 2004.

1.3 ASSESSING COMPLIANCE WITH LEAD SHOT REGULATIONS

To date, there have been no apparent prosecutions relating to the Regulations. However, research from 2002 (Cromie et al. 2002) suggested poor compliance in at least one section of the shooting community (as measured by purchase of ducks from game dealers), with 68% (27/40) of Mallard (Anas platyrhynchos) purchased from outlets across England having been shot illegally with lead. This research was criticised at the time for its inherent limitations (i.e. bias towards assessing inland duck shooting and its relatively small sample size), thus improved methodologies for measuring compliance were called for. As a response to this, Defra contracted ADAS to review compliance-measuring methodologies (ADAS 2007).

Despite a review of numerous potential methodologies, none was identified as scientifically, socially or politically acceptable and able to provide an accurate assessment of the current compliance situation. Instead, a number of methods were identified as providing some assessment of compliance but all with inherent shortcomings. Methods included: analysis of soil and sediments for shot; spent cartridge analysis; voluntary or compulsory analysis of shot wildfowl from shooters; surveys of cartridge manufacturers; analysis of ducks purchased from game dealers; and surveys of shooters and landowners.

In 2008, Defra requested research "to assess the level of compliance with the Environmental Protection (Restriction on Use of Lead Shot) (England) Regulations 1999, by undertaking a random sample of wildfowl obtained from retail and/or wholesale establishments in England to identify the shot used for killing the specimens. In addition, alternative methods (a number of which were identified in the ADAS 2007 report) should be considered and used to supplement the wildfowl survey. Compliance assessment methods need to be credible with lead shot stakeholders (both shooting and nature conservation interests)".

Subsequently, Defra contracted WWT to undertake this work. In addition to the game dealer survey, WWT sought to investigate awareness and understanding in two key stakeholder groups namely shooters and shoot providers, as suggested within the ADAS report (ADAS 2007) and thus subcontracted the British Association for Shooting and Conservation (BASC) to undertake these surveys.

1.4 AIMS AND OBJECTIVES

To assess the level of compliance with the Environmental Protection (Restriction on Use of Lead Shot) (England) Regulations 1999 as amended 2002 and 2003, by:

- 1. undertaking a random sample of wildfowl obtained from retail and/or wholesale outlets in England, including all nine Government Office regions, to identify the shot used for shooting birds, hereafter referred to as 'game dealer survey'.
- a questionnaire survey of BASC members (representative of a sub-set of the shooting community) to assess level of compliance, and awareness and understanding of the Regulations in this stakeholder group, and canvas its opinions about compliance in other stakeholder groups, hereafter referred to as 'BASC member survey'.
- 3. a questionnaire survey of shoot providers i.e. shoot managers, syndicate captains and landowners, on whose land shooting takes place to:
 - a. assess level of compliance and awareness and understanding of the Regulations;
 - b. canvas opinions regarding the Regulations;
 - c. identify what, if any, measures are, or should be, taken to ensure or encourage compliance, hereafter referred to as 'shoot provider survey'.

CHAPTER 2

GAME DEALER SURVEY

Analysis of shot types used to shoot ducks purchased from English game dealers over two consecutive winters

2 GAME DEALER SURVEY

2.1 INTRODUCTION

In a review of methods of measuring compliance with the Lead Shot Regulations, ADAS (2007) considered the purchase and analysis of shot wildfowl from English game dealers to be an absolute method of measuring compliance but which had some constraints relating to limited range of species available and coverage of types of shooting i.e. most likely reflecting inland duck shooting activities. Moreover, a number of assumptions have to be made such as belief in the information about provenance of the birds given at time of purchase. Whilst there are a number of limitations to this approach, its main strengths were seen as its practicality, ease of implementation and that it had the least chance of a biased sample when compared with other sampling methods. As previously mentioned, such a survey, albeit limited in sample size, was conducted by the RSPB and WWT in 2002 (Cromie et al. 2002). A more comprehensive assessment should therefore provide better understanding of use of lead in shot ducks in England, and provide some indication of change in level of compliance between 2002 and 2008.

2.1.1 Aims and objectives

To assess the level of compliance with the Environmental Protection (Restriction on Use of Lead Shot) (England) Regulations 1999, by:

- 1. undertaking a random sample of wildfowl obtained from retail and/or wholesale game suppliers in England to identify the shot used for shooting birds.
- 2. determining the regional use of lead shot for shooting ducks per Government Office region and for England as a whole.
- determining the use of lead shot in sections of the shooting community insofar as is possible by comparing its use in purchased Wigeon (Anas penelope) and Teal (A. crecca) with use in Mallard.

2.2 METHODOLOGY

2.2.1 Timescale

Ducks were purchased during the period November 2008 and January 2009 (Winter 1) and September to December 2009 (Winter 2) (the slight mis-match in timing between the winters reflecting the start and end dates of the contract). Winter 1 X-raying, post mortem analysis and shot analysis took place between February and July 2009 and Winter 2 between October 2009 and February 2010.

2.2.2 Purchase of shot ducks

A database of retail and/or wholesale game suppliers in England was created.

WWT staff and colleagues purchased shot Mallard, Wigeon and Teal from suppliers that fell into four main categories, namely: internet game dealers, game dealer outlets (which may also have web-sales), supermarkets and directly from shooters.

Purchasing was undertaken by either opportunistic walking into retail outlets to purchase birds, placing orders directly on the internet or more commonly by placing an order by telephone with subsequent collection in person or postal delivery of birds. An assumption was made that this is how ducks are normally purchased and thus it did not affect normal supply to game dealers.

When birds were purchased frozen, suppliers were asked when the birds had been shot, to ensure insofar as was possible, that each bird was assigned correctly to either Winter 1 or Winter 2 for subsequent analysis i.e. an assumption is made that birds purchased during a winter were of that shooting season.

Birds were labelled according to their order number and stored frozen at -20°C until further analysis.

2.2.3 Region and provenance of birds

England constitutes nine Government Office regions (Figure 2.1) and purchasing was conducted within all regions.



Figure 2.1 Government Office regions of England

Suppliers were asked at the time of purchase whether the birds had been shot locally to ensure, insofar as was possible, that they were from that region and thus of English origin i.e. an assumption was made that birds purchased in that region were shot in that region. For supermarket and internet game dealer purchases the labelling or descriptions were used to ascertain English source. It quickly became apparent that purchase of ducks from the London region represented shooting activities that may have been relatively

'local' yet were outside the region. Therefore, the few birds bought in London during the early part of Winter 1 were subsumed into the South East region and London purchasing was omitted in Winter 2. Therefore, only eight Government Office regions are represented within this report.

2.2.4 Sample size

Per region

The previous English game dealer survey (Cromie et al. 2002) indicated that 68% of shot purchased birds were shot with lead. With an assumption that compliance would have improved since then an a priori power analysis to give a 95% confidence of detecting birds shot with lead resulted in at least 30 wildfowl carcases being purchased in each of the eight Government Office regions.

Per supplier

Not all purchased birds may contain shot. Pellets may have passed through the bird, or have been removed during preparation e.g. those in the head, neck, wings or viscera, or birds may have been killed by other methods. Therefore, to enhance the likelihood of obtaining three carcases containing shot per supplier, approximately five carcases were purchased where possible from each supplier.

2.2.5 Radiography and post mortem analysis

Radiography

Shot is not always found in carcases for the reasons mentioned above. Thus to quickly eliminate birds without shot and to aid recovery of shot by pathologists, all carcases were subjected to X-raying to reveal the embedded radio-dense pellets.

X-raying was conducted using a PLH Medical K6 Electronic portable machine. A focal distance of 75cm was used with Mediphot X-ray HDC-UVB high contrast, blue sensitive radiographic film. Exposure time was 0.8 seconds. The plates were processed using an X'Ograph Nodark automatic processor.

Post mortem examination

Research has indicated that free-living wildfowl may contain embedded shot which proved non-lethal from previous exposure to shooting (e.g. Evans et al. 1973; Rees et al. 1990; Noer & Madsen 1996; Hicklin & Barrow 2004; Newth et al. In prep). The provenance of such embedded shot is impossible to obtain so it was important to ensure that only shot that had most recently entered the bird were analysed.

The full post mortem examination protocol is shown in Appendix 2.1. Notes were made throughout the post mortem examination of any significant findings and placement of all shot. Pellets were determined to be 'recent' and 'non-recent' depending on the post mortem findings.

Shot were judged to be 'recent' when they were:

- found at the site of fractured bones (ensuring that these are fractures that occurred at the time of death and not those caused thereafter) or within the bones themselves;
- 2. present within vital organs such as heart and lungs;
- 3. present within large areas of haemorrhage and bruising showing that they entered the bird at, or very shortly before, the time of death and the bird would have been unable to fly far with the damage inflicted;
- 4. present at the end of shot tracks containing feathers that had not been 'walled off' by the body in any way showing that they had recently occurred;
- 5. found at the back of the bird (or opposite side of entry) having been tracked through the rest of the body including vital organs.

Shot were judged to be 'non-recent' when they:

- 1. had been 'walled off' by the body showing they have been present for some time;
- 2. showed no sign of bruising or haemorrhage around them;
- 3. were found in non-vital areas such as loose in the coelomic cavity (accepting that they may or may not have been 'recent' but were likely to be non-lethal).

2.2.6 Shot analysis

Only shot that were considered 'recent' were subject to examination. The chemical analysis of shot is destructive. Therefore in an attempt to save some shot for any future analysis, if many 'recent' shot were removed from a carcase only a sub-set of these were analysed: where more than three shot were available three were submitted, if three shot were available then two were submitted, where two shot were available two were submitted, and where one shot was available one was submitted.

Shot type was identified using methods based in part on those used by Cromie et al. (2002) and from consultation with chemists at the University of Bristol (details are given in Appendix 2.2). In brief, these were based on their physical, chemical and additionally atomic properties i.e. aspects of appearance and malleability, ferromagnetic properties, melting point, reaction to nitric acid and potassium iodide, and, for a sub-set of shot including those for which there were some inconsistencies in other methods, examination under scanning electron microscope. These techniques readily identify steel, bismuth and lead, and distinguish them from each other. From a brief review of types of shot available on the market, lead, bismuth, steel and tungsten matrix shot type was made using results of appearance, malleability and melting point. Results of chemical analyses and scanning electron microscopy were considered conclusive. Appendix 2.3 illustrates this diagnostic process as a decision tree.

Following physical and chemical analysis, each positive 'lead' result was assigned a level of confidence based on consistency throughout the methodologies in Appendices 2.2 and

2.3 that support the element being lead. Results were therefore divided into two preliminary categories:

- 1. 'lead confident': positive lead results showing consistency in aspects of appearance and malleability, ferromagnetic properties, melting point and chemical analyses;
- 2. 'lead with inconsistencies': positive lead results consistent in some aspects of appearance and malleability, ferromagnetic properties, melting point and chemical analyses.

Where remaining 'recent' shot were available for those carcases yielding shot in category 2, pellets were assessed using scanning electron microscopy for confirmative analyses.

All shot analyses were conducted at the University of Bristol, Department of Chemistry.

2.2.7 Statistical analysis

Descriptive statistics, analysis of variance (ANOVA), Chi-squared and Fisher's exact tests were used to analyse the data.

Any statistically significant results at 95% confidence level are termed "significant" in the text.

2.3 RESULTS

2.3.1 Number of ducks bought and number containing shot

Table 2.1 shows the numbers of birds purchased and the proportions containing shot and Figure 2.2 shows numbers purchased regionally over Winters 1 and 2.

Winter 1: A total of 326 shot ducks (302 Mallard, 16 Wigeon and eight Teal) were purchased from 59 different suppliers from across England (Figure 2.2). Of these, 257 ducks (79%) contained shot of which 253 (98%) were considered to be 'recent'. Birds containing 'recent' shot represented on average 4.3 ducks purchased from each supplier.

Winter 2: A total of 319 shot ducks (280 Mallard, 14 Wigeon and 25 Teal) were purchased from 61 different suppliers from across England (Figure 2.2). Of these, 240 ducks (75%) contained shot of which 239 (100%) were considered to be 'recent'. Birds containing 'recent' shot represented on average 3.9 ducks purchased from each supplier.

Combining the data from Winters 1 and 2, 645 shot ducks (582 Mallard, 30 Wigeon and 33 Teal) were purchased from 84 different suppliers. Of these, 497 (77%) contained shot of which 492 (99%) were considered to be 'recent'. Birds containing 'recent' shot represented on average 4.1 ducks purchased from each supplier.

Of the 645 ducks purchased overall, the vast majority (621/645, 96%) were prepared and oven-ready i.e. plucked and with wings, head, neck, feet and viscera removed. Only 24/645, 4%) were in-feather.

	Winter 1		Winte	er 2	Combined	
	TOTAL	%	TOTAL	%	TOTAL	%
Number ducks bought	326	100	319	100	645	100
Number ducks without shot on X-ray	69	21	79	25	148	23
Number ducks with shot on X-ray	257	79	240	75	497	77
Number ducks with 'recent' shot	253	98	239	100	492	99
Number ducks with unsure 'recent' only	4	2	1	0	5	1
Number ducks with both 'recent' & 'non-recent' shot	18	7	3	1	21	4
Number ducks with only 'non-recent' shot	0	0	0	0	0	0

Table 2.1 Number of ducks bought plus X-ray and post mortem results



Figure 2.2 Number of ducks bought across England in Winter 1 (W1), Winter 2 (W2) and in both winters combined (Total).

2.3.2 Types of game supplier

Table 2.2 shows the types of supplier from which birds were bought. The vast majority were bought from game dealers with outlets i.e. butchers, farm shops or specialists game suppliers.

With respect to the assumption that purchasing ducks in this way did not affect normal supply to game dealers, it is not possible to know if this assumption is valid.

	Winter 1		Winter 2		COMBINED		
	Number purchased	%	Number purchased	%	Number purchased	%	
Game dealer outlet	309	95	309	97	618	96	
Internet	5	2	5	2	10	2	
Direct from shooter	8	2	5	2	13	2	
Supermarket	4	1	0	0	4	1	
TOTAL	326	100	319	100	645	100	

Table 2.2 Types of game supplier from which ducks were bought.

2.3.3 Shot type used

From hereon results refer to 'recent' shot and those birds containing 'recent' shot.

Combining results from both winters, shot from 262 ducks were classified as 'lead confident' and shot from 82 ducks were classed as 'lead with inconsistencies'. Of these 82, 58 had additional shot available for further analysis. These were subject to scanning electron microscopy and all 58 were determined conclusively to be lead. On this basis it was considered (by the project Steering Group) safe to assume that the other 24 were also lead. Thus they were classified accordingly. Figure 2.3 illustrates the chemical reactions of the different shot types and Figure 2.4 illustrates the output from the scanning electron microscope of a shot originally classified as 'lead with inconsistencies'.



Figure 2.3 Chemical reaction following warming of shot in nitric acid followed by the addition of potassium iodide.



Figure 2.4 The 'X-ray output' from scanning electron microscopy showing a shot originally classified as 'lead with inconsistencies'. The peaks indicate the shot to contain

oxygen (O), carbon (C), antimony (Sb) and lead (Pb), peak height illustrating relative abundance. The orange line to the far left of the image is the marker for identifying peaks.

Winter 1: Analyses of shot indicated that of the 253 birds from which 'recent' shot were retrieved, 176 (69.6%) had been shot with lead (including two birds that had also been shot with bismuth and two birds that had also been shot with steel).

Numbers of shot per bird ranged from 0.5-21 with a mean of 3.69 shot (s.d \pm 3.0), and mode of 1 shot.

Winter 2: Analyses of shot indicated that of the 239 birds from which 'recent' shot were retrieved, 168 (70.3%) had been shot with lead.

Numbers of shot per bird also ranged from 0.5-21 with a mean of 3.68 shot (s.d \pm 3.3), and mode of 1 shot.

Overall, combining Winters 1 and 2, 344/492 (69.9%) birds had been shot with lead. Bismuth and steel made up the majority of the other shot (15.9% and 12.4%, respectively). There was no significant difference in those shot with lead between Winters 1 and 2 (analysis of variance F=0.004, df=1, p=0.9).

Table 2.3 and Figure 2.5 show these data in more detail and illustrate the consistency in findings over the two years. Overall there were eight birds containing two types of 'recent' shot accounting for the higher number of shot types analysed than actual number of birds.

	Winte	er 1	Winter 2		COMBI	NED	
	TOTAL	%	TOTAL	%	TOTAL	%	
Number ducks shot with lead (alone or with any other shot type)	176	69.6	168	70.3	344	69.9	
Number ducks shot with lead plus bismuth	2	0.8	0	0	2	0.4	
Number ducks shot with lead plus steel	2	0.8	1	0.4	3	0.6	
Number ducks shot with bismuth (alone or with any other shot type)	41	16.2	37	15.5	78	15.9	
Number ducks shot with bismuth plus steel	2	0.8	1	0.4	3	0.6	
Number ducks shot with steel (alone or with any other shot type)	36	14.2	25	10.5	61	12.4	
Number ducks shot with other type	6	2.4	11	4.6	17	3	
Total shot type analysed *	259	102.4	241	100.8	500	101.6	
Total ducks shot	253		239		492		
	* Winter 1 includes 6 birds with 2 shot types* Winter 2 includes 2 birds with 2 shot types						

Table 2.3 Shot type used to shoot ducks in Winter 1, Winter 2 and combined



Figure 2.5 Percentage of shot type used in Winter 1, Winter 2 and combined

2.3.4 Regional use of lead

With respect to the assumption that birds were shot in the region in which they were purchased, it was thought that it was most likely that most birds were shot in the region in which they were purchased. However, there was at least one known order which comprised birds shot in one region and purchased in another, and region of provenance for supermarket-purchased birds was not always possible. Similarly, there remains a possibility that some birds were sourced from outside England, but if this did happen it was likely to have happened only rarely.

Regional breakdown of numbers of birds purchased and shot types used is shown in Appendix 2.4. Lead use per region is shown in Figure 2.6. There was no significant difference between regions (analysis of variance F=1.32, df=7, p=0.3).



Figure 2.6 Use of lead according to region for Winter 1, Winter 2 and combined

2.3.5 Use of lead per supplier type

Table 2.4 summarises the use of lead per supplier type. Combining both winters, a total of 84 separate suppliers sold 120 separate orders of ducks, 94 of which had 'recent' shot in at least one bird. If any of these shot were found to be lead, the supplier was classified as having sold lead-containing birds.

Overall 73% of suppliers sold birds containing lead shot. High proportions of game dealers, supermarkets and internet game dealers supplied ducks that had been shot with lead (noting the small sample sizes for supermarket and internet sales).

Steel shot was used for the two orders of ducks from shooters (one in each winter from the same wildfowling club).

Table 2.4Number of suppliers selling orders of ducks shot with lead over Winter 1,Winter 2 and combined.

	Winter 1				Winter 2				Combined			
	Le	ead	Non-lead		Lead		Non-lead		Lead		Non-lead	
Supplier type	No	%	No.	%	No.	%	No.	%	No.	%	No.	%
Game Dealer	31	74	11	26	35	76	11	24	66	75	22	25
Internet	1	100	0	0	0	0	1	100	1	50	1	50
Shooter	0	0	1	100	0	0	1	100	0	0	2	100
Supermarket	2	100	0	0	0	0	0	0	2	100	0	0
Total	34	74	12	26	35	73	13	27	69	73	25	27
Total suppliers		46			48				94			

selling orders of ducks containing 'recent'		
shot		

2.3.6 Use of lead for different species

Although efforts were made to maximise the number of Wigeon and Teal within the sample, these species were far less readily available in game dealers than Mallard. In total, 30 Wigeon were purchased of which 20 contained 'recent' shot, and 33 Teal were purchased of which 13 contained 'recent' shot. Despite these small sample sizes there was a significantly higher use of lead for shooting Mallards than the other two species of ducks (X^2 =39.9, df=1, p<0.001) as shown in Table 2.5 and Figure 2.7. There was no significant difference between use of lead for shooting for Teal and Wigeon (Fisher's exact test, 2-tailed probability p=0.13). The relatively high proportion of steel used for Wigeon reflects the two orders from shooters of the same wildfowling club noting this is still a relatively small number of birds in total (10/30).

	Mallar	d	Teal		Wigeor	า	Total		
Shot type	Number	%	Number	%	Number	%	Number	%	
Lead	337 *	73	5	38	2	10	344	70	
Bismuth	65 **	14	6	46	5	25	76	15	
Steel	40	9	2	15	13	65	55	11	
Other	17	4	0	0	0	0	17	3	
Total	459	100	13	100	20	100	492	100	

Table 2.5Shot type used per species combining Winters 1 and 2.

* Includes 5 birds with two shot types (lead plus steel or bismuth) subsequently subsumed into the lead category.

** Includes 3 birds with two shot types (bismuth plus steel) subsequently subsumed into the bismuth category.



Figure 2.7 Percentage shot type used for Mallard, Teal and Wigeon.

The purchase of Wigeon represents orders from six separate game dealers and two directly from shooters from five English Government Office regions (East, East Midlands, North East, North West and South East). The purchase of Teal represents orders from 10 separate game dealers and one internet game dealer from five English Government Office regions (East, East Midlands, North East, North West and South East). The sample sizes of purchased Teal and Wigeon were deemed too small to infer any meaningful conclusions about regional use of lead for those species.

2.4 DISCUSSION

2.4.1 Non-compliance with the Regulations

Lead was used in shooting 70% of the ducks indicating a high level of non-compliance with the Regulations in those providing ducks to game dealers. In the winter of 2001/2002 i.e. the third year since introduction of the Regulations, 68% of Mallards purchased as part of a smaller game dealer survey using the same methodology (but not Defra-funded) were shot with lead (Cromie et al. 2002). The current study was carried out during the 10th and 11th winters since the introduction of the Lead Shot Regulations and suggests there has been no improvement in compliance since that time.

Use of lead was widespread across all Government Office regions of England with no significant regional difference. Other than London, each region (comprising several counties) has the potential for coastal shooting, inland and driven game shooting, and rough shooting. Thus, it is difficult to infer anything meaningful about the shooting type occurring in any specific region.

Unlike the previous game dealer survey, knowledge of this current research was within the public domain (e.g. information about the research on the BASC and Defra websites, and within BASC's Shooting and Conservation magazine). Additionally, other events and activities such as the outputs from the Peregrine Fund's conference on 'Ingestion of Spent Lead Ammunition: Implications for Wildlife and Humans' in 2008 and the International Council for Game and Wildlife Conservation's (CIC) shift in position on lead shot in 2009 (recommending phasing out lead shot)(CIC 2009) could have raised awareness of the use of lead shot and compliance with the Regulations and thus affect the results particularly in Winter 2. Such an increase in awareness was not evident as use of lead was consistent across the two years and regionally. Indeed, it is likely that most shooters would be unaware of these broader developments and activities at least with respect to with the CIC (Harradine pers. comm.).

Shooting activities vary as the wildfowl shooting season progresses (September 1st to January 31st (inland) and September 1st to February 20th (below high water mark)). There was initial concern that the slight mismatch in timing of purchase between the two winters might affect results. However, the similarity of results in both years suggests this was not a problem. Indeed, many of the birds purchased were not fresh but frozen and thus, it would have been impossible to safely determine the exact time of shooting during the season (and the assumption was made that birds had been shot during that season).

2.4.2 Shot type

Although no thorough review of shot types available on the market was conducted, the finding of bismuth and steel as alternatives to lead shot was to be expected as these are among the most readily available lead alternatives.

It is possible that harder shot such as some tungsten-based types and steel are more likely to pass through the body of shot ducks hence biasing the findings slightly towards softer lead or bismuth shot. However, shot were found in a high proportion of birds and this effect of differences in behaviour between shot types was considered by the Steering Group to be minimal¹.

Regarding shot analyses it is not known why there were some inconsistencies in the chemical reactions. No single cost-effective method of determining the composition of all the shot was available to the researchers throughout the analysis period hence the dependence on a series of physical and chemical tests. Reliance on scanning electron microscopy is recommended for future work if facilities are available.

2.4.3 Supplier type

Selling illegally shot quarry species of ducks i.e. those shot with lead in England is not an offence under the Wildlife and Countryside Act, 1981. Although not a specific aim of the project, the analysis per supplier type was conducted in an attempt to understand whether there was a difference in use of lead in birds from different outlet types which might reflect type of shooters supplying outlets. All categories of outlet i.e. game dealers, supermarkets and internet game dealers sold ducks that had been shot with lead and there is perhaps a role for these outlets to play in helping to improve compliance by insisting on good compliance within their suppliers.

¹ Minutes of Third Steering Group Meeting, 4/12/09

The category of 'game dealer' represents a broad spectrum of suppliers. Without a good local knowledge of specific outlets, nor an ability to make thorough enquiries at time of purchase, it is difficult to group dealers into those operating on a large commercial scale and local butchers who may acquire smaller numbers of locally shot duck from time to time, and many variations in between. It is possible that suppliers to these outlets may be from different sections of the shooting community. During coastal wildfowling relatively few ducks are shot per foreshore visit, and there are widespread rules or practice against the sale of ducks. It is likely, therefore, that most ducks provided by the suppliers originated from inland game and or inland duck/rough shooting activities where typically most ducks shot each day are sent to game outlets. These aspects will be discussed more in Chapter 3. Consideration was given to differentiating findings according to location of outlet e.g. coastal versus inland but this was discounted on the grounds of too little information about the source of birds being available.

2.4.4 Species

Mallard are widely available for shooting both on the coast and inland. They constitute a diverse population including migratory birds, reared and released birds, and feral birds. The numbers of migratory Mallard counted in the UK as part of the Wetland Bird Survey i.e. representing wintering populations, have been in decline since the 1980s (Mitchell et al. 2002; Holt et al. 2009). However, overall numbers including data from the Breeding Birds Survey have been increasing steadily (Risely et al. 2009). The increase was thought to be associated with large scale releases for shooting, especially in England (Marchant et al. 1990). These two opposite population trends would, thus, suggest that a large proportion of Mallard being shot are not from coastal wildfowling activities but more likely from inland duck shooting. Interestingly, there are suggestions that there are fewer released Mallard following the introduction of the Regulations (Harradine pers. comm.). This is difficult to measure as numbers of post-release Mallard are not necessarily detected within wintering counts (many are already dead due to shooting) or summer counts (just prior to release) (Hearn pers. comm.).

Although based on small samples, the relatively low use of lead for shooting Teal and Wigeon was not surprising. These species, in particular Wigeon, are most likely to represent migratory birds commonly shot on the foreshore by coastal wildfowlers. This section of the shooting community is considered likely to be more aware of the Regulations than inland shooters as its members shoot over or near the foreshore for species mentioned in the Regulations and have been subject to much guidance from shooting and other organisations since the introduction of the Regulations. Many clubs strictly ensure compliance with the Regulations (Harradine pers comm.).

Teal are shot both on the coast and at inland wetlands which is perhaps reflected in the use of relatively similar levels of lead and non-lead shot.

The small sample size prevents any meaningful analysis of regional use of lead for Teal and Wigeon.

2.4.5 Provenance

Although provenance of ducks was enquired about at time of purchase, it was noted that in at least one case, birds being sold in one Government Office region had been sourced in another. Moreover, there is a possibility that some birds (albeit small numbers) may have been sourced outside England e.g. in Scotland or overseas, where they may have been shot legally with lead. However, given the scale of Mallard shooting in England (Marchant et al. 1990) it is likely that if this has occurred it would account for only a very small proportion of birds bought as part of this study.

2.5 SUMMARY

- 1. In both winters 1 and 2, 70% of ducks (176/253 and 168/239 respectively) purchased from game dealers were shot with lead indicating a high level of non-compliance with the Regulations amongst those supplying ducks to game dealers
- 2. There was no significant regional difference between the eight England Government Office regions sampled (London omitted).
- 3. A significantly higher proportion of Mallard had been shot with lead than Wigeon and Teal (337/459, (73%) vs 2/20 (10%) and 5/13 (38%), respectively) which could reflect non-compliance mainly in inland game and/or duck shooting activities as coastal wildfowlers are known to supply game outlets only rarely (although the small sample size for Wigeon and Teal should be noted).
- 4. Overall, 73% of game suppliers sold ducks containing lead shot.

CHAPTER 3

SURVEY OF BASC MEMBERS

3 SURVEY OF BASC MEMBERS

3.1 INTRODUCTION

The British Association for Shooting and Conservation (BASC) is Britain's largest country shooting organisation, with over 130,000 members. This large membership may not be necessarily representative of the British shooting community as a whole, but does offer a large group of key stakeholders which can be surveyed. BASC undertakes surveys of its members relatively frequently, with resultant high response rates.

3.1.1 Aim

The aim of this study was to determine awareness, understanding, attitudes and behaviour with respect to the Environmental Protection (Restriction on Use of Lead Shot)(England) Regulations 1999 within the shooting community, by conducting a questionnaire survey of a representative sub-set of BASC members.

3.2 METHODS

A questionnaire was designed by BASC with input from WWT and the Steering Group (Appendix 3.1). The questionnaire was accepted by the Defra Survey Control Liaison Unit and the survey complied in full with the Data Protection Act 1998 and ensured full anonymity of respondents.

Questionnaires were posted to 3,000 randomly selected BASC members resident in England, in September 2009. To increase the response rate a second circulation of the questionnaire was made.

Descriptive statistics, reduction of multiple variables, and correlation analyses were used to analyse the questionnaire data.

3.3 RESULTS

3.3.1 Response rates

In all, 1,004 completed questionnaires were returned, 577 after the first circulation and 427 from the second, giving an overall response rate of 33.5%.

Twelve of the 1,004 respondents reported that their shooting during the last season was not in England (Question 1), seven did not engage with Question 1 (i.e. data were missing) and 38 answered N/A (not applicable) to all of the shooting types given in Question 1, despite going on to answer some or all of the remaining questions. A further eight respondents answered N/A to all of the survey questions. All of these respondents were excluded from further analysis. Thus, this report relates to the remaining 939 (94%) respondents only.

3.3.2 Respondent gender and age (Questions 15 & 16)

Ninety-five percent of respondents were male and just 2% female (3% of respondents did not divulge their gender) (see Figure 3.1). In both cases, the majority were in the over-50 and 31-50 age groups (94% of males and 61% of females).

To determine whether the respondents were representative of the BASC membership, the age distribution of both groups was compared. The overall percentages of males and females were similar between both members and survey groups, as were the distributions of females within each age range group and males in the under-18 and 18-30 age groups (Figure 3.1). However, males in the 31-50 and over-50 age ranges were respectively 10% and 30% higher in the survey respondents group than in the BASC membership group. Thus, an assumption that there is no gender bias in the respondents is valid but there is a bias towards respondents over the age of 31.



Figure 3.1 Gender and age ranges of BASC members resident in England and survey respondents.

3.3.3 Respondents' participation in different types of shooting during the last season (Question 1)

Respondents were asked to indicate the type(s) of shooting in which they participated during the last season (2008/9), and the approximate frequency (see Figure 3.2). For the purposes of this survey, participation in a particular type of shooting is defined as once a season or more.



Figure 3.2 Frequency with which respondents participated in different types of shooting. Percentage of respondents participating in each shooting type (at least once per season) is shown below the x axis (n=939). 'Other' types of shooting (29% of respondents participating) included mainly pest control.

Eighty percent of respondents reported participating in more than one shooting type, though not all regularly. Three percent participated in all five named types of shooting, and a further 2% also in some 'other' type of shooting (Table 3.1). On average, shooters each participated in 2.7 ± 1.3 (mean±standard deviation) types of shooting.

Number of shooting types	Percentage of respondents
1	20
2	25
3	29
4	16
5	8
6	2

Table 3.1 Number of shooting types in which respondents participated (n=939).

For each type of shooting, the majority of participants took part only once or twice a season (9-26% of respondents) and the fewest, once a week (1-14% of respondents) (Figure 3.2). The exception was driven game shooting in which the majority of those who participated did so once a fortnight (30%).

A cluster-of-variables analysis, principal components analysis and contour plots (Appendix 3.2) all showed that, respondents fell into two main groups:

1. those required to use non-lead i.e. those who shot coastal wildfowl, inland duck, inland goose or any combination of the three (regardless of whether they also participated in driven game, rough or 'other' types of shooting).

2. those not required to use non-lead i.e. those who did not shoot coastal wildfowl, inland duck or inland goose.

This division was used as the basis for analysing most of the remaining questions, where appropriate.

Ninety-nine percent of respondents were involved in one or a combination of driven game, rough and 'other' types of shooting. Table 3.2 shows the percentages of respondents according to shooting activity and whether or not non-lead shot is legally required. In total, 59% of all respondents were required to use non-lead shot in some or all of their shooting (Table 3.2, d).

Table 3.2 Percentage of respondents involved in shooting in which the use of lead shot is a) sometimes required, b) never required, and c) always required, and d) the total percentage participating in at least one type of shooting requiring the use of non-lead (i.e. the sum of (a) and (c)).

Shooting type		Legally required to use non-lead in their shooting?	Percentage of respondents (n)	
(a)	Coastal wildfowl, inland duck and/or inland goose and driven game, rough and/or 'other'	Sometimes	58.6%	(550)
(b)	Driven game, rough and/or 'other' only1	Never	40.6%	(381)
(c)	Coastal wildfowl, inland duck and/or inland goose only	Always	0.9%	(8)
(d)	Total required to use non-lead in some/all of their shooting		59.4%	(558)

¹These shooters are responsible only for shooting in which, assuming that respondents' definition of driven game, rough and 'other' types of shooting does not include inland duck or inland goose, non-lead is not a legal requirement.

3.3.4 The use of lead and non-lead shot (Question 2)

Respondents were asked to indicate for each shooting type whether they used only lead, mainly lead, mainly non-lead or only non-lead shot. Lead was mostly used for driven game, rough and 'other' types of shooting i.e. those types of shooting for which the use of lead is not restricted, and non-lead, for coastal wildfowling, inland duck and inland goose shooting i.e. those types of shooting for which the use of lead is prohibited. A small percentage of respondents reported using only lead where the use of lead is prohibited (Figure 3.3).



Figure 3.3 Extent of lead and non-lead shot used by respondents participating in each shooting type (n = 939)

When examining the use of lead shot used in each type of shooting in relation to the frequency of participation, the extent of lead shot used increased as frequency of participation in driven game and rough shooting increased (r_s = -0.09, n=709, p=0.02 and r_s = -0.09, n=674, p=0.02, respectively), but decreased as frequency of participation in inland goose shooting increased (r_s =0.156, n=183, p=0.04). Relationships between the extent of lead shot used and the frequency of coastal wildfowling, inland duck shooting and other types of shooting were not significant.

3.3.5 Supplying birds to game dealers (Question 3)

Fifteen percent of all survey respondents (140/939) supplied birds to game dealers, with approximately one third of these doing so on a regular basis. The questionnaire did not specifically ask respondents to indicate which of the types of shooting in which they participated, were the sources of the birds they supplied to dealers. More than half of those who reported supplying birds to dealers (68%) were involved in shooting requiring the use of non-lead (Figure 3.4), almost exclusively inland duck shooting. Furthermore, none of those who reported supplying birds to dealers was involved only in shooting which required the use of non-lead shot.




3.3.6 Awareness and understanding of the Regulations (Question 4)

The majority of questionnaire respondents (75-92%) answered Questions 4a-c, which tested awareness and understanding of the Regulations. Figure 3.5 illustrates the results dividing respondents into those required to use non-lead and those who are not. Understanding of the prohibited use of lead over the foreshore was better than the restrictions on lead use over wetland SSSIs and for shooting certain species, both of which were poor.

The pattern of responses to each of the three parts of Question 4 was not affected by whether or not respondents were involved in shooting requiring the use of non-lead, although a slightly higher of those who were, chose the correct answer to Questions 4a and b.

(a) Lead shot is prohibited where?



(b) Lead shot is prohibited where?



(c) Lead shot is prohibited for which species?



Figure 3.5 Responses to Questions 4a, b & c assessing awareness and understanding of where the Regulations apply and to which species. Green bars indicate those required to use non-lead shot in their shooting and blue bars, those who are not. Striped bars indicate the correct answers.

Responses to Question 4 were rescored from 1-4 according to 'correctness' i.e. whether the answer was correct (e.g. Question 4a, all shotgun shooting on or over the foreshore), almost correct (all waterfowl shooting on or over the foreshore), incorrect (all shotgun shooting everywhere) not known/missing. Using this scoring system there were weak negative correlations between the frequency of participation in driven game and rough shooting and the accuracy of responses to Question 4c, (Table 3.3 c, i).

There were weak negative correlations between the extent of non-lead used in coastal wildfowling and the responses to all three parts of Question 4 (Table 3.3, a, b, & c ii), and between the extent of non-lead used in inland duck shooting and the response to Question 4a (Table 3.3, a ii). These relationships suggest that that coastal wildfowlers and inland duck shooters who use non-lead shot have a slightly better understanding of the Regulations than other shooters and were thus able to select the correct answers to Questions 4a-c. Conversely, weak but positive relationships between the extent of lead shot used for rough, and 'other' types of shooting and the answer to Question 4b, and between driven game and 'other' types of shooting and Question 4c (Table 3.3, b, & c ii), suggest that respondents in these groups who have less need to use non-lead, have a lesser understanding of the Regulations and were less able to select the correct answers.

Neither the type(s) of shooting in which respondents participated nor the type of shot used, had any major effects upon the correctness of responses to Question 4. Fewer than 1% of respondents chose the correct answer to all three parts, and only 5%, the correct answer to two out of the three. Weak but significant correlations between the question responses themselves (Spearman rank correlations, $r_s < 0.25$, p < 0.000, n = 939) indicate that if respondents chose the correct/almost correct or incorrect answer to one part of the question, they chose similarly for the other two.

Table 3.3 Relationships between (i) respondents' frequency of participation in shooting types and (ii) the extent of lead shot used, and 'correctness' of answers to questions testing awareness and understanding of (a) where (b) the types of SSSI and (c) the species for which the use of lead shot is prohibited (calculated using Spearman rank correlations).

			(a) Where		(b) SSSI		(c) Species	
(i)		n	r _s	р	r _s	р	r _s	р
Frequency of Shooting	Coastal wildfowl	128	0.00	0.98	0.04	0.65	0.03	0.76
	Driven game	736	0.02	0.52	0.02	0.56	-0.10	0.01
	Inland duck	522	-0.03	0.56	0.08	0.09	-0.03	0.52
	Inland goose	194	-0.04	0.62	0.04	0.55	0.00	1.00
	Rough	699	0.05	0.22	0.01	0.81	-0.08	0.04
	Other	271	-0.01	0.81	0.02	0.76	-0.02	0.80
(ii)								
Shot Type	Coastal wildfowl	151	-0.22	0.01	-0.19	0.02	-0.20	0.02
	Driven game	732	0.07	0.08	0.05	0.20	0.12	0.00
	Inland duck	552	-0.10	0.01	-0.05	0.21	-0.02	0.60
	Inland goose	229	-0.11	0.11	-0.11	0.10	-0.08	0.21
	Rough	720	0.06	0.14	0.10	0.01	0.06	0.10
	Other	269	0.00	0.98	0.18	0.00	0.13	0.03

Significant correlations at $p \le 0.05$ are highlighted. Frequency of participation in shooting type scored 1-4 for once a season, once a month, once a fortnight or once a week; extent of lead shot used scored 1-4 for only lead, mainly lead, mainly non-lead or only non-lead; 'correctness' of answers scored 1-4 correct, almost correct, incorrect and don't know/missing).

3.3.7 Agreement with the reasons behind the Regulations (Questions 5 & 6)

Overall, 36% of survey respondents agreed with the reasons for the Regulations restricting the use of lead shot, 29% disagreed, 30% neither agreed nor disagreed, and a further 5% were unaware of the reasons. Amongst those legally required to use non-lead in their shooting, disagreement was slightly higher than agreement, and also higher than amongst those not required to use non-lead (Figure 3.6).





Regardless of their agreement or otherwise with the reasons behind the Regulations, respondents most commonly considered lead poisoning in birds either to be insufficient a problem to warrant the Regulations, or not a problem at all (19% of all respondents) (Figure 3.7). Others regarded the Regulations as the start of phasing out the use of lead (19%) or a means of restricting shooting (11%), or thought that there is no evidence that lead alternatives are any better than lead itself (12%).



Figure 3.7 Reasons given by respondents as to why they agree or disagree with the reasons behind the Regulations.

3.3.8 Agreement with the Regulations (Questions 7 & 8)

Agreement with the Regulations themselves followed similar patterns to agreement with the reasons behind the Regulations. In total, more respondents agreed with the Regulations (41% of all respondents) than disagreed (30%) or although fewer stated that they neither agreed nor disagreed (18%). Disagreement was higher amongst those who are required to use non-lead in their shooting than amongst those who are not (Figure 3.8) although similar percentages of respondents in both groups agreed with the Regulations.



Figure 3.8 Extent of agreement with the Regulations amongst respondents. Shown as the percentages of respondents required to comply with the Regulations in some or all of their shooting (n=558) and those who are not (n=381).

Whether agreeing or disagreeing with Regulations, the most frequent views were that non-lead is not as effective as lead (30% of respondents) (238/783) and too expensive (28%) (219/783) (Figure 3.9). Four percent (34/783) also reported that lead was not readily available. Others found the Regulations too difficult with which to comply (10%), complicated and confusing (9%), unnecessary/unjustified (6%) or not enforced (6%).



Figure 3.9 Reasons given by respondents as to why they do not wholly agree with the Regulations.

3.3.9 Respondents' compliance with the lead shot Regulations (Questions 9 & 10)

Regardless of the shooting type(s) in which respondents participated and thus, whether they are required by law to use non-lead or not, more than half (53%) indicated that they always complied with the restrictions on the use of lead, although coastal wildfowling had the highest percentage of participants who stated that they always complied (66%). When grouped according to their legal requirement to use non-lead shot in their shooting, percentages of those who said that they always complied with the Regulations were slightly higher amongst those not required to use non-lead (59% of respondents not required to use non-lead) compared with those who are (49% of respondents required to use non-lead) (Figure 3.10). The proportions of respondents reporting that they sometimes or never complied with the Regulations were significantly higher amongst those who were not (22% and 2% respectively) (X^2 =43.5, df=1, p<0.001).

When divided according to the shot type they reported using, the majority of respondents who said that they always complied with the Regulations were those who also said that they used non-lead shot to shoot coastal wildfowl or inland duck or inland goose, and those who are not required to use non-lead shot (driven game shooters, rough or 'other' types of shooters).

A small percentage of respondents who said that they always complied with the Regulations also reported using lead shot to shoot coastal wildfowl (3%), inland duck (4%) and inland goose (5%).



Figure 3.10 Extent to which respondents report complying with the Regulations. Shown as the percentage of respondents required to use non-lead (n=558) and those who are not (n=381).

The main reasons given by respondents for their partial or total lack of compliance with the Regulations were the high cost and relative lack of availability of non-lead shot (32% (210/649) and 28% (184/649) of those who sometimes and never comply, respectively), the ineffectiveness of non-lead compared with lead shot (each 28% (184/649)) the difficulty of complying with the Regulations (21% (118/649) and 18% (10/649), and the lack of enforcement (8% (43/649) and 14% (8/649)) (Figure 3.11). Other reasons included that the Regulations should apply to foreshore shooting only, rather than to inland duck, and that non-lead damages shotgun barrels.



Figure 3.11 Reasons given by respondents for non- or partial compliance with the Regulations.

3.3.10 The extent to which respondents think that other shooters comply with the lead shot Regulations (Questions 11 & 12)

The majority of respondents thought that in general, other shooters only complied with the Regulations for some of the time and gave similar reasons for that lack of compliance as they gave for their own i.e. that non-lead is not as effective as lead, is more expensive (both 21% of respondents), and not as readily available (4%). They also indicated that other shooters do not fully understand the Regulations (13%), find them too complicated (7%), difficult to comply with (11%), and think that they are unnecessary (10%) (Figure 3.12).





3.3.11 Measures to help other shooters generally to observe the lead shot Regulations more fully and where to find more information (Questions 13 & 14)

Around half of all respondents thought that more widely available and more detailed information on the Regulations would help other shooters to comply more fully (Figure 3.13). Around a third thought that guidance on the use of lead, and shoot providers, clubs and managers ensuring that lead was not used where restricted, would help. Only 6% of respondents thought that no measures were necessary.

The majority of respondents (87%) said that they would look to BASC for further information on the Regulations and 35% to other shooting organisations (Figure 3.14).







Figure 3.14 Possible sources of further information on the Regulations cited by BASC members.

3.4 DISCUSSION

3.4.1 Representativeness of respondent sample and potential biases

In terms of gender and age-range groups, the survey respondents were broadly representative of the BASC membership resident in England. The apparent over-representation of older males amongst survey respondents is very likely due to the fact that all male respondents to the survey (895) indicated the range into which their age fell, whereas the ages of almost 40% of BASC male members were unknown (prospective members are not required to divulge their age). If the same comparisons between age range groups were made using only respondents/members whose ages were known (912 of survey respondents and 39,517 of BASC members), the differences between the two groups were reduced.

Potential biases in those who responded to the questionnaire and those who did not remain unknown. It is possible, but undetermined, that there may be an element of bias in responses in that those who do not comply with the Regulations for whatever reason, may have been less inclined to complete and return the questionnaire. Such a bias may affect some results more than others.

3.4.2 Respondents' participation in different types of shooting during the last season (Question 1)

Information regarding the type(s) of shooting in which members are involved cannot be discerned from BASC's membership database. The majority of respondents reported participating in more than one type of shooting during the last season. Therefore, the division of respondents into those who are required to comply with the Regulations and those who are not provided a more meaningful basis for analysing responses to many of the questions. This division was supported by the results of the principal components and cluster-of-variables analyses, and the contour plots (Appendix 3.2).

As well as an overlap between respondents in relation to the shooting types in which they participated, there was almost certainly some overlap between the shooting types themselves, which in turn, may have influenced how respondents reported their participation. Driven game shoots for instance, frequently include duck drives, and respondents may or may not have distinguished between these and specific inland duck shooting. Likewise, rough shooting can encompass more informal shooting of duck and goose inland, and pigeons and other species, which might also come under 'other' types of shooting. This needs to be borne in mind when interpreting the results.

Given the variety of shooting that may be involved in driven game and rough shooting, the high percentages of respondents involved in each is not surprising and reflect those of a larger survey of BASC members in 2006 (BASC 2010). Meanwhile, the comparatively low percentage of coastal wildfowlers is similar to that estimated following a BASC survey of waterfowl shooters in 2007 (BASC 2008).

3.4.3 The use of lead and non-lead shot (Question 2)

The predominance of lead as the shot of choice in driven game, rough and 'other' types of shooting is not surprising given that non-lead is not normally a legal requirement in these types of shooting unless the intended quarry are duck or geese. As previously mentioned, some shooting of duck during game drives may or may not have been recorded as inland duck by respondents, and vice versa.

For coastal wildfowling, inland duck and inland goose shooting, a greater number of respondents reported using only non-lead than lead (only lead, mainly lead and mainly non-lead), suggesting that compliance or awareness of the need for compliance with the Regulations is higher amongst respondents shooting these species than for 'other' types of shooting.

In reporting using only lead for shooting coastal wildfowl, inland duck and inland goose during the last season, a small number of respondents (<1-4%) appear not to have complied with the Regulations. Some may have reported using lead in situations where non-lead is required, specifically to take the opportunity to express their views regarding the Regulations. These views are however, in accord with those expressed by the majority of respondents, regardless of the shot type they use, or their level of agreement and compliance with the Regulations (see 3.4.6 and 3.4.7 below).

3.4.4 Supplying birds to game dealers (Question 3)

Analysis of the responses to this question suggests that the highest proportions of individuals supplying birds to game dealers can be found amongst those participating in shooting types where the use of non-lead is required i.e. coastal wildfowling, inland duck and inland goose. This seems unlikely particularly in the case of coastal wildfowlers, amongst whom there is a general attitude against the sale of ducks. Indeed, many wildfowling clubs have rules which prohibit the sale of ducks shot by their members. In fact, the results are deceptive in that all of those involved in coastal wildfowling are also involved in driven game, rough and/or 'other' types of shooting. Respondents were not asked to specify which of the shooting types in which they were involved, were the source(s) of the birds they supplied and therefore someone participating in coastal wildfowling and driven game shooting for instance, may supply dealers with birds from the latter only.

The percentage of suppliers involved in inland duck shooting (68%) that this type of shooting may be the source of any birds supplied to game dealers from 'non-lead' shooting. In particular the numbers of ducks shot during commercial duck shoots inland are likely to be sufficiently large, and intended to be sold to dealers, whereas those supplied from small duck drives at the end of a driven game day, may or may not reach the game dealer, depending on the numbers taken by the participating Guns.

3.4.5 Awareness and understanding of the Regulations (Question 4)

The results testing respondents' awareness and understanding of the Regulations are more positive than they might initially seem. Despite not choosing the correct answers to

Questions 4b and c, the majority of respondents believe that the restrictions on the use of lead apply to all wetland SSSIs and to all waterfowl. If their choice of shot type is based on that understanding, it is assumed that they will be using non-lead shot not only in situations where they are required to do so, but also those in which they could legitimately use lead i.e. they are potentially exceeding the requirements of the Regulations.

3.4.6 Agreement with the Regulations and the rationale behind them (Questions 5 to 8)

Overall, the patterns agreement/disagreement with the reasons behind the Regulations and the Regulations themselves are similar. Broadly speaking, respondents who agreed with both are those to whom the restrictions on the use of lead shot do not apply (driven game, rough and 'other' types of shooters), or those who reportedly comply (i.e. coastal wildfowlers, inland duck and inland goose shooters who use non-lead shot). Amongst the few who reported using lead to shoot coastal wildfowl, inland duck or inland goose, disagreement was greater than agreement. It is unlikely that all of this non-compliance is due to a lack of awareness given that the Regulations have been part of UK law since 1999 and, the amount of information available via organisations such as BASC. As indicated earlier, it is possible that a small minority of respondents may have reported their non-compliance in order to 'make a point' and convey their opinions regarding the Regulations and reasons behind them (additional strongly worded comments on some of their questionnaires reinforce this suggestion). Conversely, given that the survey asked respondents if they broke the law, it is possible that there is actually higher noncompliance than is indicted by respondents.

In general, the reasons given for disagreeing with the reasons behind the Regulations or the Regulations themselves were mainly that non-lead is (reportedly) not as effective as lead, is too expensive and not as readily available, and that the Regulations are too complicated and difficult with which to comply. Most commonly members disagreed with the reasons behind the Regulations because they think that restrictions on the use of lead are unnecessary and merely a means of restricting shooting and phasing out lead completely

3.4.7 Respondents' level of compliance with the Regulations and their reasons for non-compliance (Questions 9 & 10)

Taken at face value, the responses to Questions 9 suggest reasonable compliance with the Regulations as the majority (53%) report that they always comply and thus, use non-lead shot when required. However, a third said that they only complied with the regulations sometimes. Whilst a small proportion of the 3%, who said that they never complied may have been taking the opportunity to express their disagreement with, disapproval and/or defiance of, the Regulations it is likely that some respondents are likely to say that they comply when they do not. Question 9 did not define compliance, and some respondents might have indicated that they sometimes comply on the basis of, for instance, taking part in game drives which sometimes include duck drives and for which they are thus required to change to non-lead cartridges.

Nevertheless, taking these above factors into account, a small number of respondents openly indicating that they do not comply with the Regulations (and appreciating that this is potentially an under-estimation of the situation), suggests that there is still a problem.

3.4.8 Respondents' perceptions of the level of compliance amongst other shooters and their reasons for non-compliance (Questions 11 & 12)

Unless it is the case that all who completed the survey themselves comply fully with the Regulations (which the responses to Question 2 indicate is not the case), but do not know of anyone else who does, there is something of a discrepancy between the responses to Questions 9 and 11. It is possible that for some respondents, their impression of the level of compliance amongst other shooters is a more accurate reflection of their own level of compliance than their responses to Question 9 indicate, particularly since the reasons that they give for others' lack of compliance are very similar to those given for their own.

3.4.9 Measures to help other shooters generally to observe the lead shot Regulations more fully and where to find more information (Questions 13 & 14)

The overriding opinion amongst respondents was that more detailed and widely-available information would help other shooters observe the Regulations more fully. These same measures are most likely also to be those that respondents thought would improve their own ability to comply with the Regulations.

3.4.10 Additional information/comments/suggestions from members

Comments and suggestions from the 15% of respondents who chose to use the blank space on the end of the questionnaire were varied in their wording, but by and large, reflected opinions already expressed via questions 6, 8 and 10.

3.5 SUMMARY

- 1. Amongst BASC members, 15% of respondents supplied birds to game dealers, though only 5% did so regularly. It was not possible to identify the shooting types that were the main sources of these birds although it would seem that the majority of those supplying used non-lead when required to do so by the Regulations (Question 3).
- 2. When tested on their understanding of the Regulations, more than half of respondents were clear as to where the use of lead shot was prohibited (Question 4a). Respondents were not clear as to the types of SSSI or species to which the restrictions on lead shot apply. However, their responses suggest that they understand the 'spirit' of the law and are 'over-applying' rather than 'under-applying' the Regulations i.e. using non-lead where they could legitimately use lead (Question 4).
- 3. The proportions of respondents reporting that they sometimes or never complied with the Regulations were significantly higher amongst those who were required to use

non-lead in their shooting (41% and 4% respectively) than amongst those who were not (22% and 2% respectively) (X^2 =43.5, df=1, p<0.001).

- 4. The main reasons given for disagreeing with the rationale behind the Regulations were that the Regulations are the start of phasing out lead and a means of restricting shooting rather than a measure to reduce lead poisoning in birds, which was generally deemed to be not a problem/sufficient problem to justify the Regulations (Question 6).
- 5. Reasons given for disagreeing with the Regulations and for respondents' and other shooters' non- or partial compliance, were mainly centred on the reported poor performance and availability, and the high price of non-lead cartridges compared with lead, lack of enforcement, and the complexity of, and difficulty in complying with, the Regulations (Questions 8, 10 & 12).
- 6. In general, respondents thought that more detailed and widely available information and better enforcement of the Regulations would help other shooters to comply more fully. The majority indicated that they would turn to BASC for further information.

CHAPTER 4

SURVEY OF SHOOT PROVIDERS

4 SURVEY OF SHOOT PROVIDERS

4.1 INTRODUCTION

Section 5(1) of the Regulations states that "Any person who contravenes [the Regulations] or causes or permits another person to contravene [the Regulations] shall be guilty of an offence". No case law exists to test precisely the interpretation of "causes or permits", but it is understood that responsibility lies with both the shooter and those who provide shooting, that is, own or manage land on which shooting takes place and/or manage the shooting themselves i.e. a shoot provider. Thus, a shoot provider could be expected to ensure compliance by making it a requirement for participation and not permitting non-compliance.

4.1.1 Aims and objectives

The aim of the study was to assess the level of awareness, understanding, attitudes and behaviour with respect to the Environmental Protection (Restriction on Use of Lead Shot) (England) Regulations 1999 as amended in 2002 and 2003, by a questionnaire survey of shoot providers i.e. landowners, land/shoot tenants/managers, gamekeepers and syndicate captains. The study also aimed to canvas opinions regarding the Regulations and identify what, if any, measures are, or should be, taken to ensure or encourage compliance.

4.2 METHODS

A questionnaire based on that sent out to BASC members (Chapter 3) was designed by BASC with input from the Country Land and Business Association (CLA), WWT and the Steering Group (Appendix 4.1). The questionnaire was accepted by the Defra Survey Control Liaison Unit and the survey complied in full with the Data Protection Act 1998 and ensured full anonymity of respondents.

A single circulation of the questionnaire was posted on behalf of BASC by CLA to a random selection of 3,000 of its members, resident in England.

Descriptive statistics were used to analyse the questionnaire data and comparisons with responses from the BASC member survey (Chapter 3) made within the Results section.

4.3 RESULTS

4.3.1 Survey response rate and respondents' status (Question 1)

In all, 814 completed questionnaires were returned, giving a response rate of 27%, fairly typical for a one-circulation BASC survey.

Question 1 asked respondents to identify themselves as landowners either with or without shooting taking place on their land, or as non-landowners with shooting taking

place on someone else's land. Non-landowners were also asked to indicate whether they were land managers, shoot managers, tenants, gamekeepers or 'other'.

Forty eight per cent of respondents were eliminated from further analysis, the vast majority of these being landowners without shooting on their land (other did not engage in Question 1 or replied 'not applicable' to all questions).

The remaining 426 respondents to whom the remainder of this report refers were either landowners with shooting on their land (89%) or non-landowners providing shooting on someone else's land (11%). The non-landowners could be further divided into those who were shoot tenants (3.3% of respondents), land managers (2.8%), shoot managers (2.3%), gamekeepers (1.2%) and 'others' (1.2%), who were an agent, a company director, a gun club member, a picking-up team organiser and a vermin controller.

4.3.2 Types of shooting provided by shoot providers (Question 2)

Sixty percent of the 426 respondents provided two or more of the types of shooting listed in Question 2 (Table 4.1), with 3% providing all five types (i.e. coastal wildfowling, driven game, inland duck and inland goose, and rough shooting). Two percent of shoot providers also provided 'other' types of shooting, mainly pigeon, crow and rabbit shooting and other pest control.

Number of shooting types	Percentage of respondents		
1	38		
2	31		
3	19		
4	9		
5	3		

Table 4.1 Number of shooting types provided by shoot providers (n = 426).

Sixty-two percent of respondents provided two or more of the types of shooting listed although none provided all six types. On average, respondents each provided 2.1 ± 1.1 (mean ± standard deviation) types of shooting, most commonly driven game and rough shooting (68% and 64% of respondents, respectively) (Figure 4.1). The majority of the 162 individuals who provided only one type of shooting were associated with rough or driven game shooting (19% and 16% respectively, of all shoot providers) and, to a far lesser degree, 'other' types of shooting (4%). No respondents provided any one of coastal wildfowling, inland duck or inland goose shooting alone.



Figure 4.1 The types of shooting (a) provided by shoot providers (orange bars) and, for information, (b) in which BASC survey respondents participated during the 2008/9 season (purple bars).

The same division between shoot providers was used to analyse much of the remaining data as was used in the BASC members' survey (Chapter 3) i.e. those providing shooting in which the use non-lead shot is not required and those providing shooting in which the use of non-lead was sometimes or always required. Thus, 98% of shoot providers provided one or a combination of driven game, rough and 'other' types of shooting. These types of shooting provided are shown in Table 4.2. In total, 41% of all respondents provided shooting in which the use of non-lead was sometimes or always required (Table 4.2, d).

Table 4.2 Percentage of shoot providers providing shooting in which the use of nonlead is a) sometimes required b) never required c) always required and d) the total percentage responsible for at least one type of shooting requiring the use of non-lead (i.e. the sum of (a) and (c)).

Shooting type		Provision of shooting in which non-lead legally required?	Percentage of respondents (n)	
(a)	Coastal wildfowl, inland duck and/or inland goose and driven game, rough and/or 'other'	Sometimes	40.8%	(174)
(b)	Driven game, rough and/or 'other' only ¹	Never	57.5%	(245)
(c)	Coastal wildfowl, inland duck and/or inland goose only	Always	0.2%	(1)
(d) T S	otal providing shooting where use of n cometimes/always required	41.1%	(175)	

¹ These shoot providers provide shooting in which, assuming that respondents' definition of driven game, rough and 'other' types of shooting does not include inland duck or inland goose, in terms of the Regulations non-lead is not a requirement.

4.3.3 Awareness and understanding of the Regulations (Question 3)

Between 94% and 97% of all shoot providers answered the four parts of Question 3, all of which tested awareness and understanding of the Regulations. These results are shown in Figure 4.2.









(c) Lead shot is prohibited for which species?







Figure 4.2 Responses to Question 3, assessing awareness and understanding of where the Regulations apply (a & b), to which species (c) and where responsibility for ensuring compliance lies (d). Green bars indicate shoot providers' provision of shooting in which the use of non-lead shot is required, and blue bars, those providing shooting in which the use of lead is permitted. Striped bars indicate the correct answers.

The trends of responses to each of the four parts of Question 3 were unaffected by whether or not respondents provided shooting requiring the use of non-lead, although a slightly higher percentage of those who were, chose the correct answer to Questions 3a, b and d.

4.3.4 Legal responsibility and methods of ensuring compliance on land/shoots (Questions 4 & 5)

The majority of shoot providers, whether landowners or not, reported that on their land/shoots, legal responsibility for ensuring compliance with the Regulations lay with the landowner (47%) or land/shoot manager (35%), with a small percentage (three-quarters of whom were landowners) stating that the shoot tenant was responsible (Figure 4.3).



Figure 4.3 Legal responsibility for ensuring compliance on shoot providers' land/shoots (n = 426).

Most commonly, shoot providers reported that compliance was ensured on their land/shoots by making it a requirement of participation (55%), and giving instruction at the start of shoots (47%). This is shown in Figure 4.4 along with the other cited methods.



Figure 4.4 Means by which compliance with the Regulations is ensured on shoot providers' land/shoots (n = 426).

4.3.5 Shoot providers' opinions of the Regulations (Question 6)

Sixty-six percent of respondents selected more than one of the options listed as to shoot providers' opinions of the Regulations, most commonly that the restrictions are the start of phasing out all lead in shooting (48% of shoot providers) and simply a means of restricting shooting (27%) (Figure 4.5). Just below 40% and 30% of shoot providers respectively, considered the Regulations to be difficult to comply with, and confusing. Around a third thought that the Regulations were unjustified given the level of lead poisoning in waterbirds and 17%, that they were not necessary at all as lead poisoning in waterbirds is not a problem. Conversely, 27% of providers believed the Regulations to be essential to reduce lead poisoning in waterbirds and that they were 8% insufficient.



Figure 4.5 Shoot providers' opinions of the Regulations (n = 426).

4.3.6 Measures that would help shooters to observe the Regulations more fully (Question 7)

More than half of all respondents gave more than one measure that they considered would help shooters to observe the Regulations more fully, including providing more widely available information on the reasons for the Regulations (52% of shoot providers), more detailed information on what the Regulations mean for shooting (38%) and guidance on the choice and use of non-lead cartridges (38%) (Figure 4.6). Twenty-seven percent of respondents thought that shoot providers and managers should ensure lead is not used where restricted and 3% that there should be better enforcement of the Regulations. Just over one-fifth of providers considered measures unnecessary, as shooters comply with the Regulations.



Figure 4.6 Measures which shoot providers considered would help shooters to observe the Regulations more fully.

4.3.7 Advising others where to find further details on the Regulations (Question 8)

More than 50% of respondents reported more than one possible source of further information for shooters, the majority (84%) included BASC as one those sources (Figure 4.7). A small number of respondents pointed out that suggesting websites as a possible source of further information was not helpful to those without computer/internet access.



Figure 4.7 Possible sources of further information on the Regulations cited by shoot providers (n = 426).

4.4 DISCUSSION

4.4.1 Representativeness of survey sample and potential biases

In order to minimise the number of questions posed to CLA members, the survey did not ask respondents to indicate their age or gender. Furthermore, the ages and gender of the CLA membership were not available for comparison.

Potential biases in those who responded to the questionnaire and those who did not, remain unknown.

4.4.2 Types of shooting provided by shoot providers

The distribution of the different types of shooting provided by shoot providers was broadly comparable with that of BASC members' participation in the same shooting types (Figure 4.1). That is, respondents most commonly provided driven game, followed by rough, inland duck and 'other' types of shooting and finally, inland goose shooting. The percentages of respondents providing each type of shooting were lower than the percentages of members participating, almost certainly because the proportion of those providing more than one type of shooting was also lower (62% compared with 80%). BASC members who participated in just one type of shooting were associated mainly with rough and driven game shooting and, to a lesser extent, 'other' types of shooting with just a few solely involved in coastal wildfowling, inland duck or inland goose shooting. Likewise, shoot providers providing one type of shooting only were also associated with rough, driven game and 'other' types of shooting, to the exclusion of coastal wildfowling, inland duck and inland goose shooting.

The fact that the majority of shoot providers provided more than one type of shooting means that categorising them by shooting type was not possible. However, given that the patterns in provision of the different shooting types by providers and participation by BASC members in those shooting types were similar, a similar division according to whether some or all of the shooting types provided require the use of non-lead or not, seemed appropriate and resulted in percentages of 41% and 57% respectively. This balance of individuals is almost reversed in comparison to that of BASC members participating in the same types of shooting (59% and 41% respectively). The majority of shoot providers providing shooting where the use of non-lead is required were landowners. If their land on which shooting takes place is on or over the foreshore or a listed SSSI, then these landowners will always be providing shooting requiring the use of non-lead. However, participants in shooting that takes place on or over the foreshore or SSSIs, can also travel to take part elsewhere in shooting which does not require the use of non-lead.

Notwithstanding, the same potential overlaps between shooting types described in Chapter 3, particularly in relation to driven game and inland duck shooting and between inland goose, rough and 'other' types of shooting, also need to be borne in mind when interpreting the results presented above.

4.4.3 Awareness and understanding of the Regulations (Question 3)

For Questions 3b and c, the percentages of all shoot providers choosing each of the possible responses were similar to those of all BASC members. That is, the majority thought that the restrictions on the use of lead shot applied to shooting on or over all wetland SSSIs and to all waterfowl shooting everywhere (rather than on or over certain SSSIs and to certain waterfowl everywhere). For Question 3a, a slightly higher percentage of providers thought that the restrictions applied only to waterfowl shooting on or over the foreshore rather than to all shooting. In each case, however, the majority choosing the 'incorrect' options were respondents providing shooting which does not require the use of non-lead. Such responses suggests that those providing shooting which does require the use of non-lead are slightly better informed and, thus, equipped to ensure compliance with the Regulations on their land/shoots. Again, as for the BASC members' survey, if those providing shooting requiring the use of non-lead manage their shoots in accordance with their understanding of the Regulations, they will be 'over-applying' the law and implementing the use of non-lead shot in situations in which the use of lead is not prohibited.

For Question 3d, the majority indicated that they understand that responsibility for ensuring compliance with the Regulations lies with both the individual shooter and the shoot provider.

4.4.4 Legal responsibility and methods of ensuring compliance on land/shoots (Questions 4 & 5)

The responses to Question 4, which aimed to determine who has responsibility for ensuring compliance on providers' land, supports the relatively positive responses to Question 3d discussed above. That is, the majority of shoot providers reported that the landowner or land/shoot manager was responsible, with the higher percentages being among those providing shooting requiring the use of non-lead. The fact that a substantial proportion (just under one-third) of landowners said that responsibility for compliance on their land lay with the land/shoot manager suggests that not all landowners manage the shooting that takes place on their land and/or, do not understand their responsibilities. Nonetheless, whether or not they themselves manage the shoots, landowners may be legally responsible for compliance with the regulations on their land. A few landowners (3%) did not indicate who was responsible for compliance on their land and 8% indicated that they did not know how compliance was ensured although only a very small number of these landowners reportedly provided shooting requiring the use of non-lead. Somewhat contradictorily, 5% of landowners who reported providing shooting types requiring the use of non-lead in Question 2 (10% of such shoot providers) indicated that those types of shooting were omitted from their shoots.

Most providers indicated that compliance was a requirement on their land and/or that instructions to that effect were given at the start of shooting. What is not known is the extent to which compliance through each shooting day was checked and, where necessary, corrected.

4.4.5 Shoot providers' opinions of the Regulations (Question 6), measures that would help shooters observe the Regulations more fully (Question 7), and sources of information for others (Question 8)

Question 6 was similar to corresponding questions in the BASC members' survey (Chapter 3, Questions 6 & 8), and shoot providers' opinions of the Regulations encompassed those expressed by BASC members regarding both the Regulations and the reasons behind them, albeit that the emphases were slightly different.

Both groups responded similarly to the questions listing measures that might help shooters observe the regulations more fully, with respondents recommending more widely available information about the reasons behind the Regulations and what they mean for shooting, and guidance on the choice and use of non-lead cartridges. Both groups thought that shoot providers should ensure that lead is not used in situations where it is restricted, which, in the case of this shoot providers' survey, implies that individuals think that other shoot providers do not ensure compliance as well as they do themselves. On the other hand, only a very small group of shoot providers (3%) thought that the Regulations should be better enforced. Twenty-one percent stated that no measures are necessary as shooters comply with the Regulations.

Percentages of shoot providers indicating that they would first recommend BASC when advising others where to look for further information were similar to those of BASC members who would themselves turn to BASC. However, more shoot providers than BASC members said they would turn to Defra's website and put it ahead of other shooting organisations and gunshops/gunsmiths. The percentage of shoot providers who indicated that they would themselves provide advice corresponded to that of BASC members who said that they would turn to their shoot provider.

4.4.6 Additional information/comments/suggestions from shoot providers

Seven percent of respondents chose to use the blank space on the end of the questionnaire. However, as with the BASC members' survey, comments and suggestions offered only served to reiterate opinions already expressed in Questions 6 and 7.

4.4.7 The relationship between shoot providers and shooters

The results from this shoot providers' survey may, in part, explain those from the BASC members' survey, particularly those revealing a lack of awareness and understanding of the Regulations amongst a substantial proportion of BASC members and shoot providers particularly in light of the game dealer survey (Chapter 2).

A substantial proportion of shoot providers appears not to understand fully either the Regulations, or their own responsibilities in terms of ensuring compliance among those who shoot with or through them i.e. that lead is not used in situations where legislation requires non-lead. Consequently, it is not surprising if those who shoot on the land of such providers also do not fully understand or comply. Shooters may be ill-advised by shoot providers or not advised at all. In the worst-case scenario, if shoot providers are

aware of but choose to ignore the Regulations, it is likely that those shooting on their land will follow suit.

Notwithstanding the responsibilities of the shooters, it would appear that further efforts are needed to inform shoot providers of the Regulations and encourage these individuals to implement them, particularly with respect to those shooting on the land they own or manage for shooting.

4.5 SUMMARY

1.

- (a) The majority of shoot providers (~60-90%) was unclear as to where the use of lead was prohibited and for which species. However, their responses suggest that they would be 'over-applying' rather than 'under-applying' the Regulations i.e. ensuring that shooters on their land use non-lead where could legitimately use lead.
- (b) More than half of all providers (56%) were clear about who is legally responsible for ensuring compliance with the Regulations, although this means that just under half were not clear (Question 3).
- (c) In general, providers' understanding of the Regulations appeared to be unaffected by whether or not they provided shooting for which the use of nonlead was required.
- 2. The majority of providers reported that on their land: -
 - (a) the landowner or land/shoot manager had legal responsibility for ensuring compliance (Question 4) (46%). This was consistent with providers' responses to Question 3d (6b above),
 - (b) compliance was a requirement of shooting (55%) and that Guns were given instructions to that effect at the start of shoots (47%) (Question 5).
- 3. The majority of shoot providers: -
 - (a) considered the Regulations to be the start of phasing out all lead in shooting (48%) and reported them to be difficult in practice to implement (39%) (Question 6),
 - (b) suggested that more information (63%) and guidance (38%) would help shooters to comply with the Regulations (Question 7) and indicated that they themselves would direct shooters requiring further information to BASC (83%)(Question 8).
- 4. In general, the results from this shoot providers' survey reflect those of the BASC members' survey and help to explain the findings of the game dealers' survey.

CHAPTER 5

DISCUSSION AND SUGGESTIONS TO IMPROVE COMPLIANCE

5 DI SCUSSI ON

5.1 Compliance with the Regulations

The high level of use of lead for shooting ducks in England suggests that it is unlikely that the Regulations are achieving their aim of reducing unnecessary mortality of waterfowl. The results of the game dealer survey show that in the 10th and 11th seasons since the introduction of the Lead Shot Regulations, lead shot is still being used extensively, to shoot over two thirds (70%) of ducks sold by game suppliers across all regions of England with no apparent improvement since research in 2002 (Cromie et al. 2002). Moreover, this current study took place during a period in which the discussion of lead ammunition and its effects on human and wildlife health was arguably higher than at any other time in the last decade. However, the Peregrine Fund's conference on lead ammunition in 2008 and knowledge of this Defra compliance study being in the public domain with related articles in the shooting press, did not apparently alter use of lead for shooting ducks in England between the two winters (2008/09 and 2009/10).

Although not an offence under the Wildlife and Countryside Act, 1981, nearly three quarters of game suppliers in England sold ducks shot with lead. It is difficult to precisely identify the source of these ducks but it is likely that a high proportion were sourced from inland shoots (both duck shoots and game shoots including duck) rather than coastal wildfowlers for whom the sale of ducks is either prohibited by club rules or generally discouraged.

5.2 Understanding of the Regulations

Overall, both questionnaire surveys demonstrate mixed understanding of the detail of the Regulations but generally good understanding of the 'spirit' of the Regulations i.e. if shooters complied with what they understood the Regulations to mean, this would, by default, mean that they complied with the Regulations as they would be 'over-applying' rather than 'under-applying the Regulations. However, the fact that many answered incorrectly perhaps illustrates the complexity of the Regulations. Regardless, of effectiveness, the regulations for both Scotland and Northern Ireland (Appendix 1.1) are arguably less complex and a comparison with compliance within these regions would be of interest although no such studies have been conducted to date.

Similarly, both questionnaire surveys demonstrate some confusion about where legal responsibilities lie Possible reasons for compliance and non-compliance with the Regulations

The fact that a relatively large group of BASC survey respondents would indicate that they 'sometimes' or 'never' comply with the Regulations is troubling and illustrates personal or practical difficulties in complying with the law. This level of reported non-compliance was significantly higher amongst those who should be using non-lead shot (45%) than those who may not have to use non-lead shot (24%).

5.2.1 Use of non-lead alternatives in coastal wildfowlers

Compliance with the Regulations would appear, from some responses in the BASC members' survey and to some extent the game dealer survey, to be highest within coastal wildfowlers. Compliance appeared to be relatively poor in Teal shooting, although less so in Wigeon, which may have come from coastal areas. However, these findings should be interpreted with caution as sample sizes of both species were small, may have been biased by a small number of suppliers, and may or may not have come from coastal areas. That said, the wildfowling community is a group for which the use of non-lead shot is a requirement and as a consequence, has been subject to much guidance from shooting and other organisations since introduction of the Regulations. The majority of wildfowlers are members of a wildfowling club which may result in greater awareness of the Regulations from other members, and club rules that do not permit non-compliance.

5.2.2 Disagreement with the reasons behind the Regulations

Overall, ~30% of responding BASC members and shoot providers disagreed with the reasons behind the Regulations and/or the actual Regulations themselves which undoubtedly affects motivation for compliance (Nb. the shoot providers were not then pressed on detailed reasons for disagreement). Perhaps, not surprisingly, highest levels of disagreement were in those required to use non-lead shot in their shooting.

'Lead poisoning not a problem'

The main reason for disagreement with the Regulations was cited as lead poisoning for waterfowl not being important enough to warrant restrictions, a sentiment also recognised by CIC (Kanstrup & Potts 2008). Given that lead poisoning is one of the significant causes of mortality of waterbirds (Hall & Fisher 1985; Pain 1990a, 1990b,, 1992, 1996; Brown et al. 1992; Sharley et al. 1992; Beck & Granval 1997; Friend 1999; Wetlands International 2000; O'Connell et al. 2008; Lahner & Franson 2009; Mateo 2009), this response is intriguing yet perhaps not surprising. Lead poisoning as a disease suffers from the same problems of perception as other insidious (often chronic) diseases which, by their nature, are often largely unseen by most people.

Sick and dead wild birds are often neither seen nor found by humans. Additionally, debilitated lead poisoned birds are more likely to be predated. Thus, smaller lead poisoned ducks etc. are no doubt absent from the environment before shooters are aware of them (Pain 1991). Unpublished WWT data indicate greatest public concern when wildlife mortalities are part of discrete epidemics or 'unusual' mortality events such as oil spills or acute disease outbreaks. Perhaps shooters could be persuaded to appreciate the issue of lead poisoning more if provided with evidence of the problem.

The reality and widespread occurrence of lead poisoning for waterfowl is undoubted with lead ingestion rates of between 60-70% in Southern Europe for Northern Pintail (Anas acuta) and Common Pochard (Aythya ferina) (Mateo et al. 1997; Mateo 2009), populations for which are both in marked decline in Europe (BirdLife International 2004). Despite this, there is a clear problem with convincing the shooting community and possibly, the public at large, of the problem. As some wildlife managers in the USA who

have been working on the issue of lead poisoning for decades commented "Despite the overwhelming evidence, various societal factors forestalled the full transition to non-toxic shot for waterfowl hunting until 1991" (Friend et al. 2009).

'Regulations are the start of phasing out lead and means of restricting shooting'

There was a clear perception that the Regulations are the start of a phasing out of lead shot. This is an understandable concern given a general awareness of legislation banning use of lead shot in other European countries (Appendix 1.1).

Additionally, a smaller but significant group of respondents felt that the Regulations were a means by which to restrict shooting activity. There were similar concerns documented for hunters in Denmark who felt phasing out lead shot would lead to phasing out hunting. These fears were unfounded and there has been no significant change in hunting bag since introduction of a ban of lead shot in 1996 (Kanstrup 2006).

Within the UK there is certainly great sensitivity to restrictions on shooting activities within the field sports community for several reasons including having to respond to those sections of society which oppose hunting. Interestingly, the fishing community has been less of a target for this negative interest and the banning of most lead fishing weights in 1986 (Control of Pollution (Anglers' Lead Weights) Regulations 1986), for the same wildlife protection reasons, passed off with relatively little suggestion of this being a means to end the sport of fishing.

5.2.3 Disagreement with the Regulations

'Cost and availability of non-lead alternatives'

Whether respondents agreed or disagreed with the reasons behind the Regulations, cost and availability of non-lead alternatives were cited by BASC members as the main reason for non-compliance. Lead shot is currently broadly comparable in price with steel and much cheaper than many of the alternatives (bismuth and tungsten matrix shot are some four to six times more expensive than lead shot). Presumably related to this price differential, and thus reduced demand for more expensive shot, availability of non-lead alternatives currently can be limited. If sales of lead were restricted and/or compliance was improved, then simple market forces, and supply and demand principles might be able to improve this situation through greater demand for non-lead cartridges. Although Kanstrup & Potts (2008) report encouraging developments in availability of "ballistically equal or superior shot" and its cost there are very many in the shooting community who would still disagree.

Information regarding shot available on the market and relative sales of each type over time (particularly since introduction of the Regulations) is lacking but could possibly be provided by the ammunition manufacturers. A willingness-to-pay analysis could help inform whether price and availability of shot could encourage compliance.

Although not highlighted in the surveys, other authors (Pokras & Kneeland 2009) have suggested means by which to tackle the issue of lead poisoning, namely dramatically

improving the marketing of non-lead alternatives, exploring new business models including pricing incentives for these, and encouraging technological innovation to develop better alternatives.

'Poor efficacy of non-lead shot'

From the BASC members' survey there was a strong feeling that non-compliance was linked to the poorer reported 'effectiveness' of non-lead shot in comparison with lead. Kanstrup (2006) found similar concerns before introduction of national restrictive legislation regarding lethality of shot, ballistic properties, safety and damage to firearms from Danish hunters. However, these concerns were subsequently felt to be unfounded and the author comments that "the phasing out of lead shot has now led to more focus on the efficiency and effectiveness of hunting techniques".

Within the shooting press, the alternatives to lead shot continue to be the subject of negative attention including reports on alleged poor performance (e.g. Shooting Times, April 21st, 2010). It is possible that such information helps to encourage an unwillingness to comply.

'Difficulty in complying'

'Difficulty in complying with the Regulations' was the third most cited reason for noncompliance amongst BASC members or others known to them. The precise reasons for these difficulties were not examined in the surveys and are thus the subject of speculation.

It is common that driven game shoots include drives of reared and released Mallards from ponds. It is not possible to determine to what extent this occurs from the surveys but it is thought to be a relatively common practice. Perhaps those having planned for a day's driven terrestrial game shooting may not have non-lead alternatives in their possession for when shooting such duck. Alternatively, the sudden appearance of ducks during game shooting would also mean limited time to change from lead to non-lead cartridges. However, the shoot providers indicated a range of ways in which they carry out their responsibilities including instructions being given at the start of a shoot, shooters being disciplined for non-compliance, and non-lead cartridges being provided.

'Regulations are complicated and confusing'

Although many respondents (to both BASC member and shoot provider surveys) felt the Regulations were complicated and not fully understood, the majority were able to correctly understand the 'spirit' of the Regulations i.e. if members complied with what they understood the Regulations to mean, this would result in compliance with the Regulations. Without knowledge of compliance in countries such as Scotland where the regulations are simpler i.e. restricting use of lead over wetlands (Appendix 1.1) it is hard to know if simpler regulations in England would result in better compliance and hence greater effectiveness of the Regulations.

There was some confusion over where legal responsibilities lay which possibly suggests that greater clarity in the wording of the Regulations or subsequent guidance could improve understanding.

'Regulations are not enforced'

The research does not investigate enforcement of the Regulations. However, there was a perception by some shooters that the Regulations are not enforced. The authors are not aware of any prosecutions or convictions since introduction of the Regulations in 1999. It may well be therefore, that a lack of enforcement (and all that that entails) perceived or real is likely to contribute to non-compliance.

5.3 Measures to improve compliance

5.3.1 Further guidance

Both surveys indicate the desire for more detailed and widely available information to help shooters comply with the Regulations. However, both surveys indicate that the 'spirit' of the Regulations is reasonably well understood. Further guidance on non-lead shot was also specifically requested.

Reaching all members of the shooting community poses problems for those trying to raise awareness of the Regulations e.g. Defra, Natural England or the shooting organisations. The absence of overarching bodies means that routes such as direct mailing of information would reach only a sub-set e.g. BASC members or CLA members (of whom only a proportion is involved in shooting). However, from both the BASC member and shoot provider surveys, the BASC website is most commonly used for seeking information on lead issues. This is not surprising as the information on this site is easy to find, thorough and practical. Perhaps analysis of traffic to these pages (and those of the other information providers) would provide some measure of the scale of their use. Not all shooters in the UK are BASC members, especially among inland game shooters, and it is unknown the extent to which non-BASC members utilise this resource nor whether it is accessible to those who may be less computer literate such as older sections of the shooting community.

The backdrop of lead-related activities (including articles within the shooting press) seems not to have filtered through into changes in behaviour in those supplying ducks to game outlets between the two winters. Perhaps this is not surprising given that there would appear to have been no change since the previous research in 2002. Reaching this section of the shooting community effectively with appropriate and persuasive information is one of the main challenges in addressing non-compliance.

5.3.2 Enforcement or ensuring compliance

Shoot providers ensuring compliance was cited by both surveys as a means by which to improve compliance with the Regulations. Given that the provider is often present during the shoot day this could be an effective way of achieving compliance (by making it a
requirement for participation and not permitting non-compliance). Perhaps it needs to be made clearer that such a provider, together with the shooter, are responsible under the Regulations for compliance and that reputations or businesses may be jeopardised if a prosecution was sought for causing or permitting non-compliance. Greater provision of non-lead cartridges by shoot providers to shooters may be useful and reduce the issue of 'non-availability' of non-lead alternatives but requires further investigations of the legalities and practicalities of this as a means by which to improve compliance. Moreover, it should not detract from the responsibilities of the individual shooter to comply with the Regulations.

Better enforcement generally was cited by respondents to both surveys. At present, the police is the authority to enforce the Regulations. As stated previously, it is not known to what extent the Regulations are enforced. Given that there have been no apparent prosecutions since the introduction of the Regulations in 1999, there needs to be a review of the importance attached to reporting of offences and enforcement of the Regulations or to whether other competent authorities such as Natural England or the Environment Agency have the capability and adequate resources to undertake this task. Methods for enforcement would also need to be investigated.

5.4 The approach and limitations of the study

As the ADAS review concluded (ADAS 2007), measuring compliance is not straightforward and all methods for doing so have inherent limitations. The approach taken in this study of physically investigating the nature of shot used to shoot ducks in England and then investigating where and why this may happen has arguably provided more insight into the problem than might have been envisaged at the outset. That said, limitations of the methods used remain and are outlined below.

5.4.1 The game dealer survey

The game dealer survey does not necessarily represent the shooting community as a whole but is more likely to investigate compliance within the inland game and/or duck shooting community. Moreover, the possibility remains of some game suppliers sourcing their birds from outside England (although if this does occur it is likely to be relatively unusual).

This study has illustrated the extent of non-compliance and investigated some aspects of possible reasons why non-compliance with the Regulations occurs. However, only five per cent of respondents in the BASC members' survey regularly supply ducks to game dealers (a further 10% do so sometimes). The study has not determined precise information about types of shooters involved, the way in which this supply to outlets occurs, nor how demand for shot ducks affects shooting behaviour.

5.4.2 The BASC member and shoot provider surveys

Questionnaire surveys are prone to non-response bias. Moreover, questioning behaviour with respect to breaking the law provides additional problems. The Regulations in

England, though appropriate with respect to reducing risk to waterfowl, are considered by the authors and many of the respondents to be relatively complex to understand fully. Good guidance on the Regulations and how they affect shooting activities is available, most notably on the BASC website. Traffic to this guidance during the period of completion of the questionnaires might provide some insight into whether or not the Regulations were fully understood by respondents.

Precise motivation for not complying fully or partially with the Regulations remains unknown despite the information generated by the surveys. That respondents to the surveys often undertook different types of shooting prevents clear conclusions being drawn about where use of lead for shooting ducks is highest.

6 SUGGESTIONS TO IMPROVE COMPLIANCE

For more than ten years BASC and other NGOs from the shooting and conservation communities have worked to raise awareness of the issue of lead poisoning of waterfowl from the ingestion of spent lead shot, the Regulations in England and the need for waterfowl shooters to comply with them. This work has included the provision of information on alternative shot types available for use in the UK. Efforts were increased after 2002 when a WWT/RSPB report found a poor level of compliance with the Regulations from one sector of the shooting community. However, as this current study has demonstrated, the level of compliance in some sectors, probably those primarily reflecting game and/or inland duck shooting, remained low. It is unknown to what extent increased education and awareness would appreciably increase the level of compliance, although this should certainly be attempted. From the results of the questionnaire surveys, it is possible that a better level of compliance can be achieved through more effective enforcement of, and ensuring compliance with, the existing legislation (by various agencies or shoot providers for example), or through other options, such as changes in legislation and further restrictions on the use of lead shot. Therefore, the following suggestions to improve compliance are made:

6.1 Continued persuasion

6.1.1 Raise awareness of the findings of this report

It is recommended that the findings of this report are publicised widely amongst the shooting community by Defra and the shooting organisations. Such publicity should communicate the message that the shooting community needs to understand that compliance will help reduce unnecessary mortality and morbidity of waterbirds and continued non-compliance has the potential to affect their reputation, lead to changes in public acceptance of shooting, and also lead to further restrictions on the use of lead shot.

6.1.2 Raise awareness of the problem of lead poisoning for waterfowl

Despite extensive published literature on lead poisoning in waterfowl, the welfare and conservation impacts appear to not be fully appreciated by many in the shooting community. Powerful means of visually communicating the scale and unpleasantness of the problem to the shooting community should to be undertaken by some or all of the following: Defra, the shooting organisations, welfare organisations, voluntary and statutory conservation bodies.

6.1.3 Provide information and guidance about the Regulations more widely

Broad understanding of the 'spirit' of the Regulations was generally good. However further information has been requested by the respondents to the surveys and should be provided in the main by the shooting organisations, gunshops, Defra and shoot providers.

6.1.4 Reassure the shooting community that the Regulations are not intended to restrict shooting activities any more than necessary

Clear communications to the shooting community should be made by Defra and/or the shooting organisations to attempt to disentangle the perceived reasons for the Regulations from the real reasons (i.e. avoidable mortality of waterfowl), and to aid reassurance that the Regulations are not a means to restrict shooting activities any more than necessary. Moreover, these communications could include the potential consequences of continued non-compliance on public acceptance of shooting.

6.1.5 Utilise communication media such as the BASC website

The BASC website was a popular communication resource for BASC members and shoot providers (although only a proportion of the latter are BASC members). Thus, this resource should be used where appropriate for communicating issues regarding lead poisoning and compliance with the Regulations as well as publicising the results of this study.

6.1.6 Provide information and guidance on the efficacy and use of non-lead alternatives

With respect to non-lead shot, there are likely to be both a number of real and perceived problems (i.e. efficacy, cost and availability) and changes in shooting behaviour that need to be made accordingly. Current guidance should be more effectively disseminated by shooting organisations, Defra and/or ammunition manufacturers. Additionally, lessons learnt from other countries where lead shot has been restricted should be reviewed to inform how best to do this.

6.1.7 Additionally focus measures on inland game and/or duck shooting activities

Although there would appear to be problems with non-compliance with the Regulations in certain sections of the shooting community, the greatest problem seems to lie with those shooting duck inland. This section of the shooting community should be a main, but not the only, focus for targeted actions.

6.1.8 Encourage game dealers to demand compliance in their suppliers

Game is an increasingly popular food and Defra should work with the game, food and retail industry to encourage game dealers to demand better compliance in their suppliers.

6.2 Enforcement or ensuring compliance (by not permitting non-compliance)

6.2.1 Enforce the Regulations

The apparent perception that the Regulations are unenforced requires attention. Issues surrounding enforcement to date need to be investigated and addressed by Defra. It is recommended Defra reviews the current arrangements for the enforcement of the Regulations to consider if they are fit for purpose.

6.2.2 Encourage shoot providers to not permit non-compliance

The most powerful way to reach the greatest number of shooters at any one time, regardless of shooting activity, is likely to be via shoot providers. This sub-set of the shooting community has a responsibility to comply with the Regulations and ensure they are not permitting non-compliance in their shooters and so should be strongly encouraged to do so. This encouragement should come especially from Defra, landowners, shooting organisations or the local enforcement authorities, as necessary.

6.3 Other options

6.3.1 Requests for Defra and the Lead Ammunition Group

It is requested that Defra and, where appropriate, the newly formed Lead Ammunition Group examine the options for improving compliance with, and thereby the effectiveness of, the Regulations for the benefits of waterfowl in England. This should include examination of the options listed above and others, such as working with the ammunition manufacturers and suppliers to address issues of efficacy and cost of non-lead alternatives, and other changes in the legislation likely to result in appreciably improved compliance.

6.3.2 On-going monitoring

On-going monitoring of the level of compliance within the different sectors of the shooting community is necessary and should be conducted to measure the impact of these suggestions, if implemented.

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APPENDIX 1.1

Country	Lead regulations?	Year introduced	Where/how restrictions apply
Albania	No	-	-
Andorra	No	-	-
Armenia	No	-	-
Austria	No	-	-
Azerbaijan	No	-	-
Belarus	No	-	-
Belgium	Yes	2008	Total ban on use of lead shot in all areas except for the Walloon region whereby the restriction applies to hunting in wetlands ^{1/1}
Bosnia & Herzegovina	No	-	-
Bulgaria	No	-	-
Croatia	No	-	-
Cyprus	Yes	2007	Lead shot banned for hunting in wetlands ²⁻¹
Czech Republic	No	-	-
Denmark	Yes	1996	Total ban on the use, possession and trade of lead shot in all areas ³ '1
Estonia	No	-	-
Finland	Yes	1996	Lead shot banned for hunting waterfowl ' $\ensuremath{`^{\rm i}}$
France	Yes	2006	Lead shot banned for hunting in wetlands $^{\prime 1}$
Georgia	No	-	-
Germany	Yes	1993+	Lead shot banned for hunting in wetlands and waterfowl near waterbodies in eight regions ¹ . Also banned for waterfowl shot in terrestrial habitats in one region (Schleswig-Holstein) ¹ . Lead shot banned in the federal forests of Brandenburg ^{1/11/1}
Greece	No	-	-
Hungary	Yes	2005	Lead shot banned for hunting in important wetlands (e.g. Ramsar sites) ^{1′12′1}
Iceland	No	-	-
Ireland	No	-	-
Italy	No	-	-
Latvia	Yes	1999	Lead shot banned for hunting waterfowl in important wetlands (e.g. Ramsar sites) ¹³
Liechtenstein	No	-	-
Lithuania	No	-	-
Luxembourg	No	-	-
Macedonia	No	-	-
Malta	No	-	-

Country	Lead regulations?	Year introduced	Where/how restrictions apply
Moldova	No	-	-
Monaco	No	-	-
Montenegro	No	-	-
The Netherlands	Yes	1993 (use), 1998 (possession)	Total ban on the use, possession and trade of lead shot in all areas ^{3'13'1}
Norway	Yes	1995	Total ban on the use, possession and trade of lead shot in all areas ^{13/12/1}
Poland	No	-	-
Portugal	No	-	-
Romania	No	-	-
Russia	No	-	-
San Marino	No	-	-
Serbia	No	-	-
Slovakia	No	-	-
Slovenia	No	-	-
Spain	Yes	2007	The use and possession of lead shot banned in all the Natura 2000 protected wetlands ¹
Sweden	Yes	2002 (wetlands), 2006 (all areas), 2008 (bullets)	Total ban on the use of lead shot in all areas ^{1'1}
Switzerland	Yes	1998	Lead shot banned for hunting in shallow water areas and wetlands ^{13'1}
Turkey	No	-	-
Ukraine	No	-	-
United Kingdom			
England	Yes	1999 (2002, 2003 amendments)	Lead shot banned over foreshore and certain (wetland) SSSIs and for hunting wildfowl, coot and moorhens in all areas ''
Wales	Yes	2002	Lead shot banned over foreshore and certain (wetland) SSSIs and for hunting wildfowl, coot and moorhens in all areas ¹
Scotland	Yes	2004	Lead shot banned for hunting over wetlands (for any type of shooting activity) ¹
Northern Ireland	Yes	2009	Lead shot banned for hunting over wetlands (for any type of shooting activity) ¹

¹AEWA 2005, ²AEWA 2008, ³Kuivenhoven et al. 1998, Kanstrup 2006, HMSO 2003, HMSO 2002a, HMSO 1999, Scheuhammer & Norris 1996, J.Y Mondain-Monval pers. comm., ¹ N Kenntner pers. comm., ¹1Kenntner et al. 2007, ¹²Kanstrup & Potts 2008, ¹³Beintema 2001, ¹ HMSO 2009, ¹ HMSO 2009, ¹ HMSO 2004, ¹ Mateo 2009, ¹ HMSO 2002b

APPENDIX 2.1

WWT Post Mortem Examination Protocol

Personal protective equipment (including latex gloves) is worn throughout the post mortem. Appropriate health and safety measures are taken to prevent zoonotic infection.

- 1. Each bird is individually labelled and radiographed to identify the number and position of pellets it contains.
- 2. An external examination is carried out noting degree of preparation e.g. ovenready with viscera removed, "in feather" intact etc., number and placement of any wounds (together with any identifying marks and broken bones in "in feather" birds).
- 3. "In feather" birds are plucked.
- 4. The skin is incised along the midline and separated from underlying muscles.
- 5. The muscles is examined for bruising and wounds from pellets.
- 6. The pectoral muscles are reflected away from the sternum and ribs and dissected to find any pellets present.
- 7. The ribs are cut along the line of angulation and the sternum is reflected and removed.
- 8. Any in situ viscera is examined for bruising and wounds from pellets.
- 9. Where intact viscera are present they are removed and each individual system examined:
 - i. Gastrointestinal tract, liver, spleen
 - ii. Heart and respiratory tract
 - iii. Kidneys and gonads.
- 10. The remaining material from the carcase is disposed of as carcases for incineration.

Notes are made throughout the post mortem examination of any significant findings and placement of all pellets. Pellets are labelled as 'recent' and 'non-recent' to as great a degree as is possible.

Pellets are judged to be 'recent' when they are:

- found at the site of fractured bones (ensuring that these are fractures that occurred at the time of death and not those caused thereafter) or within the bones themselves;
- 2. present within vital organs such as heart and lungs;
- 3. present within large areas of haemorrhage and bruising showing that they entered the bird at, or very shortly before, the time of death and the bird would have been unable to fly far with the damage inflicted;
- 4. present at the end of shot tracks containing feathers that had not been walled off by the body in any way showing that they had recently occurred;
- 5. found at the back of the bird (or opposite side of entry) having been tracked through the rest of the body including vital organs.

Shot were judged to be 'non-recent' when they:

- 1. had been walled off by the body showing they have been present for some time;
- 2. showed no sign of bruising or haemorrhage around them;
- 3. were found in non-vital areas such as loose in the coelomic cavity (accepting that they may or may not have been 'recent' but were likely to be non-lethal).

APPENDIX 2.2

Methodology for differentiating pellet types using physical and chemical property analyses (adapted from Cromie et al. 2002).

Provisional diagnosis of pellet type was made using results of appearance, malleability and melting point. Results of chemical analyses were considered conclusive. Known pellet types (lead, bismuth, steel and tungsten matrix) were used as positive controls throughout the analyses.

Magnetic properties

If magnetic, the pellets were considered to be steel.

Appearance and malleability

The colour and form of the non-magnetic pellets was examined. Those with a slight steely or golden reddish tint were suspected to be bismuth. Those that were dark, dull and deformed were suspected to be lead or possibly bismuth.

When sanded with fine grain sandpaper and cut with a scalpel blade, those exposing shiny surfaces were considered to be either lead or bismuth. If exposed surfaces appeared slightly golden reddish, they were suspected to be bismuth. Those that were relatively soft were suspected of being lead, whilst those that were harder and more brittle were suspected of being bismuth or another compound.

Melting Point

Pellets were heated for 10 minutes in a partitioned porcelain tray in a muffle furnace at 295°C and 330°C. Pellets melting at 295°C and forming molten shiny globules upon manipulation were considered to be bismuth. Pellets retaining their shape and remaining hard at 295°C, yet becoming soft at 330 °C were considered to be lead.

Chemical analysis

 Pellets were warmed at 90°c and simultaneously shaken at 300 rpm on a hot plate in 10ml of 12.5% nitric acid for five minutes. Following this period 2ml of 10% potassium iodide solution was added. Those forming a bright yellow precipitate (i.e. lead iodide) were considered to be lead. Those forming a dull amber/dark orange yet clear solution (i.e. bismuth iodide) were considered to be bismuth. Based on aspects of this methodology a level of confidence was attached to each lead result.

Sensitivity of this chemical analysis

Lead iodide (PbI_2) is formed as a yellow powder by adding potassium iodide (KI) solution to a solution of lead nitrate or acetate. It is barely soluble in cold water (0.06% at 15 degrees) but on boiling it dissolves (4.34 gm per

litre) and on cooling golden yellow droplets separate. It is soluble in a large excess of KI, forming KPbI₃ but deposits again on dilution (Partington, 1950).

Given this test is qualitative it was not possible to assign sensitivity. However, using standard stock solutions it was possible to determine the limits of detection (LOD).1ml of standard stock solutions (manufactured for Atomic Absorption Spectrometry) of lead nitrate (50 ppm, 100 ppm and 200 ppm) was added to 1ml for KI 10%. At 50 ppm no visual colour change was observed, at 100 ppm some precipitation was observed and using 200 ppm more precipitation was observed. Thus, at 100 ppm (100 μ g) lead can be detected.

Scanning electron microscopy (SEM)

1. Each sample was prepared by mounting individual pellets onto aluminium blocks held in place by adhesive. Four sample mounts were loaded into a carrier and placed inside the specimen chamber of the SEM. A high energy beam of electrons scanned each sample surface by interacting with the sample atoms to produce signals. Resulting characteristic x-rays were then assessed to identify the composition and measure the relative abundance of elements in the sample using each peak. Topographic images were also taken. Magnification of 50 times was chosen as standard to examine each sample. In this instance SEM was considered non destructive as pellet samples are electrically conductive on the surface requiring no additional coating substance.

APPENDIX 2.3

Shot type analysis decision tree



APPENDIX 2.4

Proportion of ducks shot with lead per region

	Winter 1		Winter 2		Combined	
East						
Number ducks with recent shot	36	100	28	100	64	13
Number ducks shot with lead (alone or with other shot type)	22	61	17	61	39	61
East Midlands						·
Number ducks with recent shot	32	94	29	100	61	12
Number ducks shot with lead (alone or with other shot type)	25	78	22	76	47	77
North East						
Number ducks with recent shot	26	100	27	96	53	11
Number ducks shot with lead (alone or with other shot type)	16	62	22	81	38	72
North West						
Number ducks with recent shot	31	100	29	100	60	12
Number ducks shot with lead (alone or with other shot type)	20	65	16	55	36	60
South East						
Number ducks with recent shot	37	100	32	100	69	14
Number ducks shot with lead (alone or with other shot type)	24	65	17	53	41	59
South West						
Number ducks with recent shot	28	100	32	100	60	12
Number ducks shot with lead (alone or with other shot type)	23	82	21	66	44	73
West Midlands						
Number ducks with recent shot	32	100	28	100	60	12
Number ducks shot with lead (alone or with other shot type)	26	81	21	75	47	78
Yorkshire & The Humber						
Number ducks with recent shot	31	94	34	100	65	13
Number ducks shot with lead (alone or with other shot type)	20	65	32	94	52	80
TOTAL	253		239		492	

APPENDIX 3.1

Questionnaire sent to BASC members

Shooting and the Lead Shot Regulations in England

1. In the last shooting season, if you were shooting in England approximately how often did you participate in any of the following types of shotgun shooting? Please tick <u>one</u> box for <u>each type</u> of shooting

	✓	\checkmark	1	1	✓
	Approx. weekly	Approx. once a fortnight	Approx. once a month	Once or twice during the season	Not at all
Coastal wildfowling (ducks, geese, waders)					
Driven game shooting					
Inland duck shooting					
Inland goose shooting					
Rough shooting					
Other types of shotgun shooting (excluding clay target shooting)					

*If "other types of shotgun shooting" please describe (excluding clay target shooting)

If you please tick here \Box and <u>return the questionnaire to the address on page 7</u>. Otherwise, please proceed to Question 0.

2. Which type of shot do you generally use for the following types of shooting? Please tick <u>one</u> box for each shooting type

√	\checkmark	\checkmark	\checkmark	√
Only lead	Mainly lead	Mainly non-lead	Only non-lead	N/A
	✓ Only lead □ □ □ □ □	 ✓ ✓ Mainly lead □ □<	✓✓Only leadMainly leadMainly non-lead□□□	Image: symbol

3. Do you supply birds to game dealers? Please tick <u>one</u> box

\checkmark	\checkmark	√	✓
Yes, regularly	Yes, sometimes	No	N/A

4. In England, the use of lead shot for shotgun shooting is restricted under some circumstances. Which statement, in each of the following three groups, best reflects your understanding of those regulations?

а.	Where? Please tick <u>one</u> box only Lead shot is prohibited for:	1
	i. all shotgun shooting everywhere	
	ii. all shotgun shooting on or over the foreshore	
	iii. all waterfowl* shooting on or over the foreshore only	
	iv. don't know	
	* ducks, geese, waders, coot, moorhen	
b.	Sites of Special Scientific Interest (SSSIs) Please tick <u>one</u> box only Lead shot is prohibited for:	4
	i. shooting on or over all SSSIs	
	ii. shooting on or over certain SSSIs only	
	iii. shooting on or over all wetland SSSIs	
	iv. don't know	
C.	Species Please tick <u>one</u> box only Lead shot is prohibited for:	4
	i. shooting any bird species	
	ii. shooting any waterfowl*	
	iii. shooting certain waterfowl everywhere	
	iv. don't know	
	* ducks, geese, waders, coot, moorhen	

5. Please indicate to what extent you agree with the reasons behind the lead shot regulations?

Please tick <u>one</u> box only

\checkmark	\checkmark	\checkmark	\checkmark
Agree	Neither agree nor disagree	Disagree	Unaware of the reasons

6. If you ticked 'disagree' in Question 0 above, please indicate. Please tick as many answers as appropriate. Otherwise, please go to Question 0.

	~
Lead poisoning in waterbirds is not a problem	
Lead poisoning in waterbirds is a problem but not sufficiently great to justify the restrictions	
The legislation is simply a means of restricting shooting activities	
The legislation is the beginning of phasing out all lead shot in shooting	
There is no evidence that substitutes for lead shot are any better than lead	
Other (please explain):	

7. To what extent do you agree with the lead shot regulations as they affect you in your shooting?

Please tick one box only

\checkmark	\checkmark	✓	\checkmark	✓
Agree	Partially agree	Neither agree nor disagree	Partially disagree	Disagree

8. If you ticked 'partially disagree' or 'disagree' in Question 0 above please indicate your reason(s).

Please tick as many answers as appropriate

	v
Complying with the regulations when shooting is too difficult	
Non-lead cartridges are not readily available	
Non-lead cartridges are too expensive	
Non-lead cartridges are not as effective as lead cartridges	
There is no enforcement of the regulations	
The regulations are complicated and confusing	
Information about the need for the regulations is difficult to find/inadequate	
Information about how the regulations affect me is difficult to find/inadequate	
Other (please explain)	

9. To what extent do you comply with the regulations (please be honest!)? Please tick one box only

\checkmark	1	~	\checkmark
Always	Sometimes	Never	Cannot comment as I do not fully understand the regulations

10. If you ticked 'sometimes' or 'never' in Question 0 above, please indicate your reason(s). Please tick as many answers as appropriate. Otherwise, please go to Question 0.

	√
Complying with the regulations when shooting is too difficult	
Non-lead cartridges are not readily available	
Non-lead cartridges are too expensive	
Non-lead cartridges are not as effective as lead cartridges	
There is no enforcement of the regulations	
Other (please explain):	

11. To what extent do you think that other shooters generally comply with the lead shot regulations? Please tick one box only

\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
Always	Sometimes	Never	Cannot answer as I do not shoot with anyone else	Cannot comment as I do not fully understand the regulations

12. If you think that other shooters generally do not fully comply with the lead shot regulations, what do you think are their reasons? Please tick all relevant boxes below

If you think that other shooters generally do comply with the regulations, please go to Question 0.

	✓
They don't fully understand the regulations	
They find the regulations complicated and confusing	
They find complying with the regulations when shooting too difficult	
They think that non-lead cartridges are not as effective as lead cartridges	
They think that non-lead cartridges are too expensive	
They find that non-lead cartridges are not readily available	
They consider that there is no need to restrict lead shot	
They think that they will not be caught if they use lead where restricted	
Other (please describe):	

✓

13. Which of the following measures do you think would help other shooters generally to observe the lead shot regulations more fully? Please tick <u>all</u> relevant boxes

No measures are necessary as shooters comply with the regulations	
More widely-available information on the reasons for the regulations \table	
More detailed information and guidance on what the regulations mean for shooting $\hfill \Box$	
Better enforcement of the regulations	
Shoot providers or managers ensuring lead is not used where restricted	
Guidance on the choice and use of non-lead cartridges	
Other (please describe):	

14. If you wanted to find more information on the lead shot regulations, where would you think of looking for it? Please tick <u>all</u> relevant boxes

	✓
Shoot providers, clubs or managers	
Other shooters	
Shooting organisations and their websites	
DEFRA website	
Natural England website	
Gunshops/gunsmiths	
Other (please describe):	

15. Please indicate your age.

	✓		✓		~		✓
Under 18		18-30		31-50		Over 50	

16. Please indicate your gender

	√		√
Male?		Female?	

17. In which county in England do you live?

If you have any further information or comments/suggestions you would like to make in relation to this survey, please use the space below.

Please return your completed questionnaire as soon as possible in the pre-paid envelope (no stamp required) to:

Research Department

BASC

Marford Mill

Rossett

Wrexham LL12 OHL

Thank you very much for your help – it is much appreciated.

Please be assured that any information you give will be used only for this survey, will respect all Data Protection Act 1998 issues, and you will not be identified in any way

APPENDIX 3.2

Detailed investigation of respondent types

Frequency of participation in different types of shooting

Spearman rank correlations revealed positive relationships between the frequencies of respondents' participation in i) driven game, inland duck, inland goose and rough shooting, ii) rough and other types of shooting, and iii) coastal wildfowling and inland duck, inland goose and rough shooting (Figure 3.15).

Shooting Type	Driven game		I nland duck		Inland goose			Rough			Other				
	n	rs	р	n	rs	р	n	rs	р	n	rs	р	n	rs	р
Coastal wildfowl	128	-0.15	0.14	100	0.38	0.00	106	0.23	0.07	61	0.26	0.01	106	0.14	0.36
Driven game				736	0.28	0.00	463	0.23	0.00	149	0.11	0.01	523	0.01	0.84
I nland duck							522	0.48	0.00	179	0.36	0.00	407	0.10	0.22
Inland goose										194	0.29	0.00	177	-0.06	0.63
Rough													699	0.44	0.00

Figure 3.15 Relationships between frequencies with which respondents participate in different shooting types (Spearman rank correlations, significant relationships in bold)

These correlations were supported by contour plots, which showed how the frequencies of respondents' participation in three different shooting types were related to one another (Figure 3.16). For instance, although there was no correlation between the frequency of driven game shooting and coastal wildfowling, both were significantly related to frequencies of inland duck and goose shooting. The contour plot shows that in general, the frequency of inland duck shooting increased with frequency of both driven game shooting and coastal wildfowling. Respondents participating in driven game and coastal wildfowling only infrequently also participated in inland duck or goose shooting and coastal wildfowling regularly (weekly), also shot duck or geese inland on a fortnightly to weekly basis (Figure 3.16 a & b). Similarly, respondents who participated regularly in driven game shooting and coastal wildfowling, also participated regularly in rough shooting (Figure 3.16 c).



Figure 3.16 Contour plots showing how the frequency of respondents' participation in a) inland duck shooting (b) inland goose shooting and (c) rough shooting changed in relation to frequency of participation in driven game shooting and coastal wildfowling (0, not at all; 1, once/twice during the season; 2, once a month; 3, once a fortnight; 4, once a week). Nb: x and y axes represent the frequencies of participation in driven game and coastal wildfowling respectively, and the contours, that of a third type of shooting (inland duck, inland goose, or rough shooting) all from 0-4 (never to once weekly). If participation in the third type of shooting varied in exactly the same way in relation to participation in driven game shooting as it did in relation to coastal wildfowling, the contours would slope diagonally downwards from identical numbers on the x and y axes.

Each survey respondent is characterised by their frequency of participation in the six different shooting types. Each shooting type was treated as a variable with a score 0-4 indicating the frequency of shooting (from never to once a week). A cluster of variables analysis calculated using ward linkage and correlation coefficient distances was used to compare the similarities between each shooting type. This analysis showed that inland duck and goose shooting were similar (similarity = 75.3) i.e. respondents who shot inland duck with a particular frequency, also tended to shoot inland geese with similar frequency (Figure 3.17). The next most similar association was inland duck and goose with coastal wildfowling (similarity = 59.5), and there was also a similarity between rough shooting and other types of shooting (similarity = 58.2). Respondents who carried out rough shooting and/or "other" types of shooting were dissimilar from those participating in coastal wildfowl, driven game, inland duck or goose shooting (similarity = 42.2).



Figure 3.17 Cluster variable diagram showing the similarities in the frequencies with which respondents participated in different types of shooting during the 2008/9 season. Similarity calculated using ward linkage and correlation coefficient distances (n = 939).

Given that there is a certain amount of redundancy between the variables (i.e. there is some measure of correlation between certain variables), a principle components analysis was used to reduce these variables to two independent "composite" variables (called principle components). This analysis can further assess how survey respondents are characterised by their frequency of participation in each type of shooting. Two independent variables, the first and second components, in combination, accounted for 53% of the variation in the respondent data. The first of these, accounting for 31.5% of the variation, was associated with a decrease in frequency of inland duck and goose shooting, coastal wildfowling and rough shooting. The second component accounted for 21% of the variation and was associated with a decrease in the frequency of driven game shooting and increase in the frequency of other types of shooting (Figure 3.18).

The loading plot (Figure 3.18) shows that inland duck, goose and coastal wildfowling are similar and largely captured by component one, whereas as driven game, other types of shooting are related and largely captured by the component two. Driven game and other types of shooting are similar to each other, but in opposing directions. Rough shooting lies somewhere between components one and two.



Figure 3.18 Loading plot of frequency of shooting types. (shows the contribution (weighting) of each variable to each of the two principle components).

A score plot (Figure 3.19) shows where individual shooters lie in terms of the two components. Each shooter has a score in terms of the first and second components (x and y axis respectively, where zero is the average score for respondents).The distribution of data is skewed in a negative direction away from the average score on the first component. In other words, a small number of respondents shoot less frequently than the average.



Figure 3.19 Score plot showing position of individual shooters in relation to first and second components

APPENDIX 4.1

Questionnaire sent to CLA members

SHOOTING ON YOUR LAND AND LEAD SHOT

1. Which of the following statements best describes you? Please tick <u>one</u> box only

	√
I am a landowner with no shooting taking place on my land (please return the questionnaire to BASC in the prepaid envelope)	
I am a landowner with shooting taking place on my land (please continue with question 2)	
I am not the landowner but have responsibility for the shooting that takes place on this land and I am the land manager/shoot manager/shoot tenant/gamekeeper/other* (please delete as appropriate and continue with question 2)	

*If "other", please describe:

2. Which of the following types of shooting are you responsible for? Please tick as many boxes as appropriate

	✓	√
	Yes	No
Coastal wildfowling (ducks, geese, waders)		
Driven game shooting		
Inland duck shooting		
Inland goose shooting		
Rough shooting		
*Other types of shotgun shooting (excluding clay target shooting)		

*If "Other types" please describe:

3. As you may know, in England, the use of lead shot for shotgun shooting is restricted under some circumstances. Which statement, in each of the following groups, best reflects your understanding of those restrictions?

а.	Where? Please tick one box <u>only</u> Lead shot is prohibited for:	1
	all shotgun shooting everywhere	
	all shotgun shooting on or over the foreshore	
	all waterfowl shooting (ducks, geese, waders, coot, moorhen) on or over the foreshore	
	I don't know	
b.	Sites of Special Scientific Interest (SSSIs) Please tick one box <u>only</u> Lead shot is prohibited for:	√
	shooting on or over all SSSIs	
	shooting on or over certain SSSIs only	
	shooting on or over all wetland SSSIs	
	I don't know	
C.	Species Please tick one box <u>only</u> Lead shot is prohibited for:	V
	shooting of any bird species	
	shooting of any waterfowl (ducks, geese, waders, coot, moorhen)	
	shooting of certain waterfowl everywhere	
	I don't know	
d.	Responsibilities Please tick one box <u>only</u> Ensuring shooters' compliance with lead shot regulations is the responsibility of:	V
	the shoot provider (landowner, land/shoot manager/tenant or gamekeeper) alone	
	the individual shooter alone	
	the shoot provider and the individual shooter	
	I don't know	

4. In practice, who is legally responsible for ensuring compliance with the regulations on your land/shoot(s)?Please tick one box only

\checkmark	\checkmark	\checkmark	\checkmark	~
Landowner	Shoot manager	Shoot tenant	Headkeeper/Gamekeeper	Other

If "Other" please specify:

5. On your land/shoot(s), how is compliance with the regulations ensured? Please tick as many answers as appropriate

	√	
Compliance is a requirement of shooting on my land/shoot(s)		
Guns who do not comply are fined		
Non-lead cartridges are provided		
Types of shooting requiring compliance (e.g. duck drives) have been omitted/reduced		
Instructions that wildfowl must not be shot are given at the start of shoots		
I do not know		
Other (please describe):		

6. What do you think of the regulations? Please tick as many answers as appropriate

The regulations are:	~
essential to reduce lead poisoning in waterbirds	
insufficient to reduce lead poisoning in waterbirds	
unnecessary because lead poisoning in waterbirds is not a problem	
unjustified by the level of lead poisoning in waterbirds	
simply a means of restricting shooting activities	
the beginning of phasing out all lead shot in shooting	
complicated and confusing	
difficult to comply with when out shooting	
Other (please describe):	
7. Which of the following measures do you think would help shooters generally, to observe the lead shot regulations more fully? Please tick <u>all</u> relevant boxes

	√
No measures are necessary as shooters comply with the regulations	
More widely-available information on the reasons for the regulations	
More detailed information about what the regulations mean for shooting	
Better enforcement of the regulations	
Shoot providers or managers ensuring lead is not used where restricted	
Guidance on the choice and use of non-lead cartridges	
Other (please describe):	

8. If someone came to you asking for further details on the lead shot regulations, where would you advise him/her to look? Please tick <u>all</u> relevant boxes

	√
Shooting organisations and their websites	
Defra website	
Natural England website	
Gunshops/gunsmiths	
I would provide appropriate information	
Other (please describe):	

If you have any further information or comments/suggestions you would like to make in relation to this survey, please use the space below.

Please return your completed questionnaire by [date] in the pre-paid envelope (no stamp required) to:

Research Department

BASC

Marford Mill

Rossett

Wrexham LL12 OHL

Thank you very much for your help - it is much appreciated.

Please be assured that any information you give will be used only for purposes of this survey. We will respect all Data Protection Act 1998 issues and you will not be identified in any way.