Report of the

Nontoxic Shot Advisory Committee

Submitted to

Minnesota Department of Natural Resources

Fish and Wildlife Division

December 12, 2006

Nontoxic Shot Advisory Committee Report

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Executive Summary

The Nontoxic Shot Advisory Committee (NSAC) was formed by Minnesota Department of Natural Resources (DNR), Division of Fish and Wildlife (FAW), as a result of the 2006 Wildlife Roundtable where FAW agreed to study the nontoxic shot issue and report back to the Roundtable at the January 2007 meeting. The NSAC consisted of 11 people including 10 members from outside of the DNR and one staff member from DNR Enforcement. The participants represented the manufacturing and retail industry, traditional hunting constituencies, environmental groups and technical experts from other state and federal agencies. This advisory committee was asked to report back to the Division of Fish and Wildlife with recommendations for: "… (a) future additional restrictions (if any) on use of lead shot in Minnesota including types of hunting, location, etc., (b) a time frame for implementation, (c) an education/communication plan for the public including content, approach, and methods, and (d) identify information gaps and potential research needs." The NSAC met five times during 2006 and examined many facets of the nontoxic shot issue. The issues are extremely complex and conclusive data on wildlife population impacts is lacking. Furthermore, it is unlikely that conclusive data can ever be obtained due to the cost of this type of research. The NSAC did however agree on the following principles:

1. Lead is toxic to both humans and wildlife and simply is not required for life.

2. Representing a wide diversity of backgrounds (e.g., conservationists, retailers, manufacturers, biologists, human health experts, etc.) NSAC recommendations will be proactive and demonstrate leadership in dealing with this issue.

3. Phase-in periods will be utilized for implementing final recommendations.

4. Recommended hunting regulations will be simple, understandable, and enforceable.

5. A state constitutional amendment was approved by 77.2% of voters in 1998 that guarantees the right to hunt and fish. Specifically this amendment states "*hunting and fishing and the taking of game and fish are a valued part of our heritage that shall be forever preserved for the people and shall be managed by law and regulation for the public good*." NSAC seeks to maintain hunting in Minnesota in a sustainable manner while fulfilling its charge to identify options for the use of lead shot for hunting.

6. Recommendations need to recognize the impacts of potential restrictions on the use of lead shot and accommodate or mitigate these impacts.

7. It is inevitable that lead shot will have to be restricted for all shotgun hunting at some future time.

Based upon these principles NSAC was able to reach consensus that: 1) DNR should begin to regulate lead shot on managed dove fields (which was implemented in 2006) and, 2) for shotgun

hunting in general, implement regulations that are more restrictive than current state and federal regulations.
Consensus was not reached on the extent of these regulations. However, NSAC was however able to reduce the list of nearly 40 potential regulatory options to five options that seemed to make sense for further consideration by DNR. These five options include:

- Option 1. Eliminate the use of lead shot for dove hunting statewide, on all public and private lands.
- Option 2. Eliminate the use of lead shot for all small game species, in the farmland zone, on all public lands (shotgun hunting).
- Option 3. Eliminate the use of lead shot for all small game species, in the farmland zone on all public and private lands (shotgun hunting).
- Option 4. Eliminate the use of lead shot for all small game species, statewide, on all WMA's (shotgun hunting).
- Option 5. Eliminate the use of lead shot for all small game species, statewide, on all public and private lands (shotgun hunting).

Because consensus could not be reached, NSAC chose to use a level of agreement model where each member voted along a continuum from fully support to fully opposed based upon their comfort level with a given option. The options were not a stepwise progression for implementation but rather were considered as independent options. The level of agreement votes are shown graphically in the figures contained within this report. NSAC believes that the levels of agreement on the five options will help to inform and guide DNR as they move forward in this difficult process.

The federal government as a direct result of a lawsuit implemented many of the existing nontoxic requirements for waterfowl hunting. This caused the regulations to be implemented very quickly before both industry and hunters fully understood the issue, its implications, and options available to them. As a result, there was a great deal of misinformation that caused confusion and animosity. NSAC recognizes this and does not want to see this scenario repeated. Information and timing will play extremely important roles in communication strategies for this issue. NSAC worked with DNR Information Officer, Jason Abraham, to develop the outline of a communications plan that would serve as a basis for communicating key messages to the public, industry, news media, and legislature. Clear communications on the nature of the problem along with the solutions will be critical. So too will be adequate time for manufacturing and retail industry and particularly hunters to turn over existing stock and restock with appropriate nontoxic alternatives. An important missing piece of information that could significantly affect timing is that we lack knowledge of how well informed hunters are and how ready they are to accept new regulations. DNR should try to answer these questions using focus groups, hunter surveys, or some other statistically valid means.

Group Charge

In May 2006 Minnesota Department of Natural Resources (DNR), Division of Fish and Wildlife (FAW), formed the Nontoxic Shot Advisory Committee (NSAC) comprised of constituents with interests in hunting and the environment, experts in lead poisoning, and representatives from the hunting industry. This advisory committee was asked to report back to the Division of Fish and Wildlife with recommendations for:

> "… (a) future additional restrictions (if any) on use of lead shot in Minnesota including types of hunting, location, etc., (b) a time frame for implementation, (c) an education/communication plan for the public including content, approach, and methods, and (d) identify information gaps and potential research needs."

Committee Members

The NSAC was composed of 11 "voting" members and several "non-voting" DNR technical advisors. There were no DNR voting members on the committee with the exception of Major Al Heidebrink of DNR's Enforcement Division. In forming the committee, FAW decided that since Conservation Officers would be responsible for enforcing any recommendations implemented from this report that they should have a full seat at the table. The NSAC was composed of the following members:

- Mr. Bill Stevens, Conservation Manager, Federal Cartridge Company (Jason Nash and Kyle Tengwall, Alternates)
- Mr. Steve Wilds, Chief, Division of Migratory Birds, USFWS
- Mr. Jay Tirpak, Turn In Poachers
- Mr. Dan Dessecker, Senior Wildlife Biologist, Ruffed Grouse Society
- Mr. Matt Holland, Senior Wildlife Biologist, Pheasants Forever
- Mr. Gordon Meyer, MN Conservation Federation
- Maj. Al Heidebrink, DNR Enforcement (Phil Meier, Alternate)
- Mr. Mark Martell, Director of Bird Conservation, Audubon Minnesota (Craig Andresen, Alternate)
- Mr. Scott Myers, Gander Mountain LLC
- Mr. Steve Hennes, Minnesota Pollution Control Agency
- Dr. Erik Zabel, Minnesota Department of Health

DNR Advisors and staff were invited to participate in discussions and offer background information and insights to NSAC. Advisors included:

- Jason Abraham, FAW Information Officer
- Ryan Bronson, Hunter Recruitment and Retention
- Dr. Dick Kimmel, FAW Farmland Research Group Leader (Roxanne Franke, Intern)
- Jeff Lightfoot, FAW Northeast Region Wildlife Manager
- Steve Merchant, Forestland Program Leader
- Larry Nelson, FAW Assistant Director

- Ray Norrgaard, Wetland Program Leader
- Al Stevens, FAW Fisheries Program
- Kathy DonCarlos, FAW Facilitator
- Bill Penning, Farmland Wildlife Program Leader and liaison to the NSAC

Introduction

The Minnesota Department of Natural Resources, Division of Fish and Wildlife (FAW), implemented rules to restrict use of lead shot on managed dove fields on Wildlife Management Areas (WMA) for the 2006 hunting season. There is growing scientific evidence that lead shot poisoning is causing the loss of large numbers of mourning doves nationwide. Minnesota implemented its first managed dove fields this year and believes that lead shot restrictions at these locations, where shot may be concentrated, is warranted. FAW believes it will be easier for hunters to adapt to this regulation from the beginning rather than making changes in the near future. Conclusive proof regarding the effects of lead shot on other upland game populations is lacking, but the topic has received little study to date. We do know that lead is an inherently toxic substance. Lead poisoning from lead shot has been documented in many (> 40) non-waterfowl species, including upland game birds (see Fisher et al. 2006). Secondary poisoning of predators occurs when they eat prey which have ingested or wounded by lead shot.

For decades there have been efforts to remove lead from everyday products such as paint and gasoline. These efforts were driven by human health concerns. Currently, Minnesota is also trying to phase out the use of lead wheel-balancing weights, and has begun replacing lead weights on its state vehicle fleet. Just for context, it's estimated that 30 tons of weights are deposited on Minnesota roadways each year. Nationwide there is a growing concern regarding the effects of lead on fish and wildlife in general and the potential effects upon humans that consume wildlife killed with lead shot or with high lead concentrations due to environmental conditions. Currently the American Fisheries Society, Wildlife Society, Association of Fish and Wildlife Agencies, and Central Management Unit Technical Committee are working on the issue. As of 2006, 21 states had some form of lead shot restrictions above and beyond those mandated for waterfowl hunting affecting over 1.3 million acres (Case, 2006). Some states such as South Dakota have essentially banned lead shot from all public lands while other states have taken a more limited approach. Two European countries, Denmark and the Netherlands, have a total ban on lead ammunition (Genco, 2004). Given these national trends and growing scientific evidence, it is anticipated that lead shot will be prohibited in Minnesota in the future.

FAW does not expect the implementation of further lead shot restrictions in Minnesota to be without some controversy. As part of the 2006 Public Input Questionnaire, FAW asked if respondents would oppose, support or had no opinion to the statement: "Increase restrictions on the use of lead shot for small game hunting." Roughly half of the respondents opposed the scenario, one third supported it, and one fifth had no opinion. This question was asked without any background information provided. It is possible that with a significant public education campaign some of those with "no opinions" and some of the opposed positions may change their minds and support additional lead shot restrictions.

Methods

Public Presentations

To achieve a common knowledge base for NSAC discussions, provide the latest information on non-toxic shot, and dispel some of the common myths about non-toxic shot, the first meeting of the NSAC consisted of a series of presentations by experts in the field. Dr. John Schulz, Missouri Department of Conservation Research Scientist, presented the finding of his latest research (Schulz, 2006) regarding the effects of lead shot ingestion on mourning doves. George Vandel, South Dakota Game, Fish and Parks, summarized research developed and collated by Cooperative North American Shotgunning Education Program (CONSEP) regarding nontoxic shot use, effectiveness and effects on firearms. Wayne Doyle, Kansas Game and Fish Department Hunter Education Specialist, presented lessons learned from waterfowling using nontoxic shot. Mr. Vandel concluded the presentations with a report on the history, regulations, and education process implemented for nontoxic shot restrictions on public lands in South Dakota. Copies of each of the presentations are available.

From these discussions NSAC learned the following:

1. Lead is toxic in mourning doves and presumably other birds even in very small doses (1-2 pellets), and mourning doves are ingesting lead shot in the wild.
2. Much research and lethality testing has been done on non-toxic alternatives since they were first required for waterfowl hunting. Experts currently believe that modern steel loads are safe in any modern gun regardless of choke and that quality steel loads can kill as effectively as lead if hunters are properly trained.
3. Hunters, as a group, are not very good shots and could benefit significantly by having expert, structured training.
4. South Dakota successfully implemented nontoxic shot requirements for virtually all public lands by working closely with their constituents, the USFWS, and the state legislature. A substantial and thorough public education campaign was key to successful implementation.

NSAC Meetings and Process

A series of five meetings were conducted from May through September 2006. The first meeting included discussions on responsibilities and expectations for committee members and advisors as well as NSAC meeting logistics. The Committee members recognized their unique opportunity to offer recommendations to FAW on the use of nontoxic shot and valued the diverse background and expertise of NSAC members. The Committee was committed to keeping in mind Minnesota's resources, citizens, and sportsmen and women as they developed recommendations on the use of nontoxic shot for hunting.

NSAC considered the use of nontoxic shot for hunting using a graduated approach. First, initial discussions at the first two meetings established criteria and principles for final recommendations, creating an important foundation for later in-depth discussions on future restrictions of lead shot, the central charge for the Committee. The Committee then began to consider the wide range of options for the use of nontoxic shot. Initial brainstorming and discussions identified a diverse multitude of options that varied by species, land ownership

(public versus private lands), and geographic areas. Finally, the Committee narrowed this wide field of options to a smaller subset of options for in-depth discussions.

Decision Methodology

Initially NSAC attempted to use a consensus process to review and make recommendations on various management options. The Committee transitioned to a process that characterized "levels of agreement" after it was determined that "consensus" (i.e., full support with no opposing opinions) could only be reached for several options. NSAC felt that including a discussion of other options in the report would provide useful perspectives and insights for consideration and utilized "levels of agreement" to characterize the opinions of Committee members.

Seven options for restrictions of the use of lead shot for small game hunting were considered by NSAC. Following in depth discussions of each option, NSAC members chose one of five levels of agreement for each option. These levels include: (a) fully support, (b) support with reservation, (c) neutral, (d) opposed but won't block, and (e) fully opposed.

Principles and Criteria for Final Recommendations

Prior to discussing specific options, NSAC identified the principles and criteria for their recommendations on the use of nontoxic shot for small game hunting. These principles and criteria may provide useful guidance for FAW as they consider future management options.

Principles

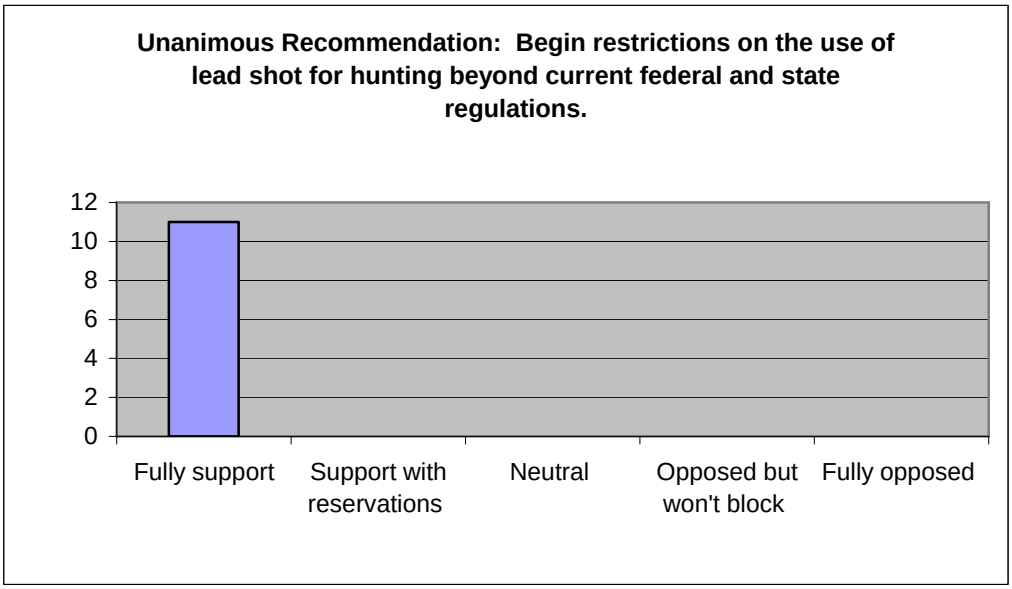
1) Lead is toxic to both humans and wildlife and simply is not required for life.
2) Representing a wide diversity of backgrounds (e.g., conservationists, retailers, manufacturers, biologists, human health experts, etc.) NSAC recommendations will be proactive and demonstrate leadership in dealing with this issue.
3) Phase-in periods will be utilized for implementing final recommendations.
4) Recommended hunting regulations will be simple, understandable, and enforceable.
5) A state constitutional amendment was approved by 77.2% of voters in 1998 that guarantees the right to hunt and fish. Specifically this amendment states that "*hunting and fishing and the taking of game and fish are a valued part of our heritage that shall be forever preserved for the people and shall be managed by law and regulation for the public good*." NSAC seeks to maintain hunting in Minnesota in a sustainable manner while fulfilling its charge to identify options for the use of lead shot for hunting.
6) Recommendations need to recognize the impacts of potential restrictions on the use of lead shot and accommodate or mitigate these impacts.
7) It is inevitable that lead shot will have to be restricted for all shotgun hunting at some future time.

Criteria

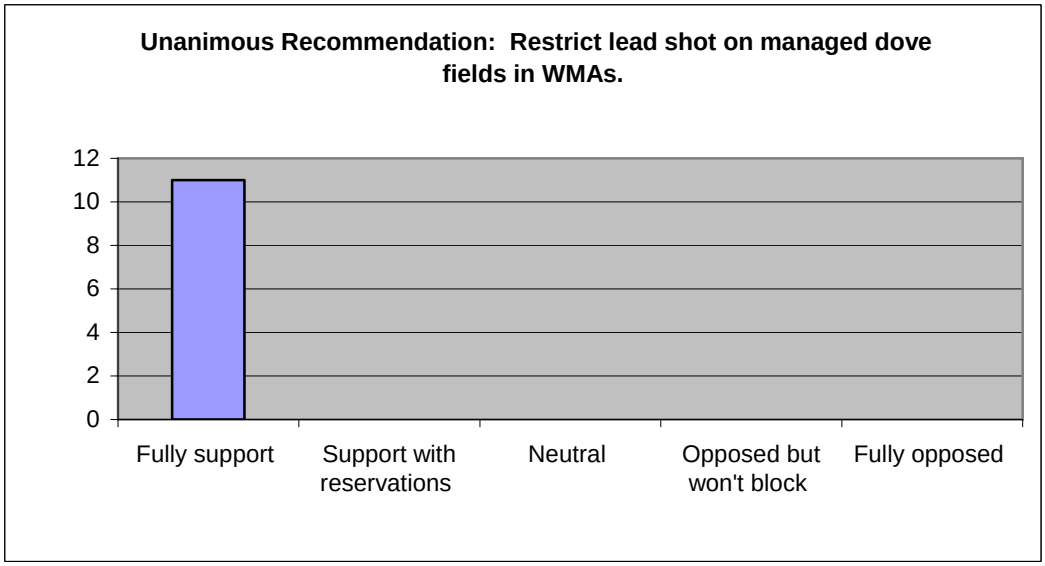
1) Final recommendations should be "time sensitive."
   a) Retailers need up to 18 months before the start of a season with lead shot restrictions in order to obtain appropriate ammunition. There should be time for retailers to clear "old" stock through sales.
   b) Consumers/hunters need a longer period of time for adjusting to lead shot restrictions. For example, the transition from lead shot to non-lead shot for waterfowl hunting extended over a five year period in the late 1980's to 1991.
   c) Manufacturers need 2 – 5 years lead time for dove lead shot restrictions and approximately 5 years for other loads.
2) Final recommendations should consider the "end users." Do the recommendations make sense for the "end user" (e.g., hunter, retailer, etc)?
3) Final recommendations should be science based (i.e., data is available to support recommendations).
4) Final recommendations should respond to lead shot impacts for wildlife including both game and nongame species. There should be a demonstrated need for the recommendations.
5) Final recommendations should consider species involved.
6) Final recommendations should consider the geographic scale.
7) Final recommendations should consider the impact on hunting as a sport.
   a) Hunter recruitment and retention
   b) Hunting ethics and values
   c) Sustainability of hunting as a sport
8) Final recommendations must be enforceable. There needs to be time for an information and education phase prior to changes.
9) Final recommendations should consider impacts of lead on humans.

Options Considered

There is unanimous agreement among NSAC that there is a need to begin restrictions on the use of lead shot for hunting beyond current federal and state regulations for waterfowl and state regulations for managed dove fields on WMAs.



Further, NSAC unanimously supports the restriction of lead shot on managed dove fields in WMAs.



Options for restricting the use of nontoxic shot for small game hunting extend along a continuum from no changes in current regulations to fully restricting the use of lead shot. Considering three variables of land ownership, species, and geographic range, dozens of potential scenarios can be identified. Twenty-six options were identified by the group as having potential. NSAC further

reduced the field of options and deliberated on the following five scenarios or options (Table 1). Each option was discussed as an independent and unrelated scenario. A consensus recommendation could not be reached on any of these options; however, NSAC believes it is beneficial to summarize the discussions on these options by providing polling results, advantages, disadvantages, and mitigation considerations for each option.

- Option 1. Eliminate the use of lead shot for dove hunting statewide, on all public and private lands.
- Option 2. Eliminate the use of lead shot for all small game species, in the farmland zone, on all public lands (shotgun hunting).
- Option 3. Eliminate the use of lead shot for all small game species, in the farmland zone on all public and private lands (shotgun hunting).
- Option 4. Eliminate the use of lead shot for all small game species, statewide, on all WMA's (shotgun hunting).
- Option 5. Eliminate the use of lead shot for all small game species, statewide, on all public and private lands (shotgun hunting).

Table 1. Options and implementation timelines considered for restricting the use of lead shot for small game hunting.

OPTIONS	**1. DOVES, STATEWIDE, ALL PUBLIC AND PRIVATE LANDS**	**2. ALL SMALL GAME SPECIES[1], FARMLAND ZONE[2], ALL PUBLIC LANDS (SHOTGUN HUNTING)**	**3. ALL SMALL GAME SPECIES[1], FARMLAND ZONE[2], ALL PUBLIC AND PRIVATE LANDS (SHOTGUN HUNTING)**	**4. ALL SMALL GAME SPECIES[1], STATEWIDE ALL WMA'S (SHOTGUN HUNTING)**	**5. ALL SMALL GAME SPECIES[1], STATEWIDE, ALL PUBLIC AND PRIVATE LANDS (SHOTGUN HUNTING)**
PUBLIC EDUCATION PROGRAM	Notify public during 1st hunting season	Notify public during 3 hunting seasons	Notify public during 3 hunting seasons	Notify public during 3 hunting seasons	Notify public during 5 hunting seasons
FULL IMPLEMENTATION	Fully implement in 2nd season.	Fully implement in 4th season	Fully implement in 4th season	Fully implement in 4th season	Fully implement in 6th season.

Table 1 Notes:
1. Although wild turkeys are defined in Minnesota Statute 97B.711as upland game birds, separate regulations have been developed for wild turkeys. Therefore, NSAC excluded wild turkeys from their consideration and recommend that FAW address lead shot restrictions for wild turkeys in a different venue.

Advantages for all five options: Each of these options represents a proactive step in limiting and reducing the deposition of lead in the environment.

Disadvantages for all five options: Scientific surveys have not been completed to determine Minnesota hunter attitude and values or levels of acceptance of possible scenarios pertaining to the use of nontoxic shot for small game hunting. During public input meetings in winter 2005/2006, the Section of Wildlife asked if the participants supported, were opposed or had no opinion to increasing restrictions on the use of lead

shot for small game hunting. Given no additional background information 42% of respondents who voiced an opinion supported additional restrictions and 58% opposed. Although these data were not derived from a random survey, they are relevant to the work of the NSAC. A survey of Missouri dove hunters shows 70-80% of hunters (in some population segments) are opposed to additional non-toxic regulation (Schulz et.al., in press).

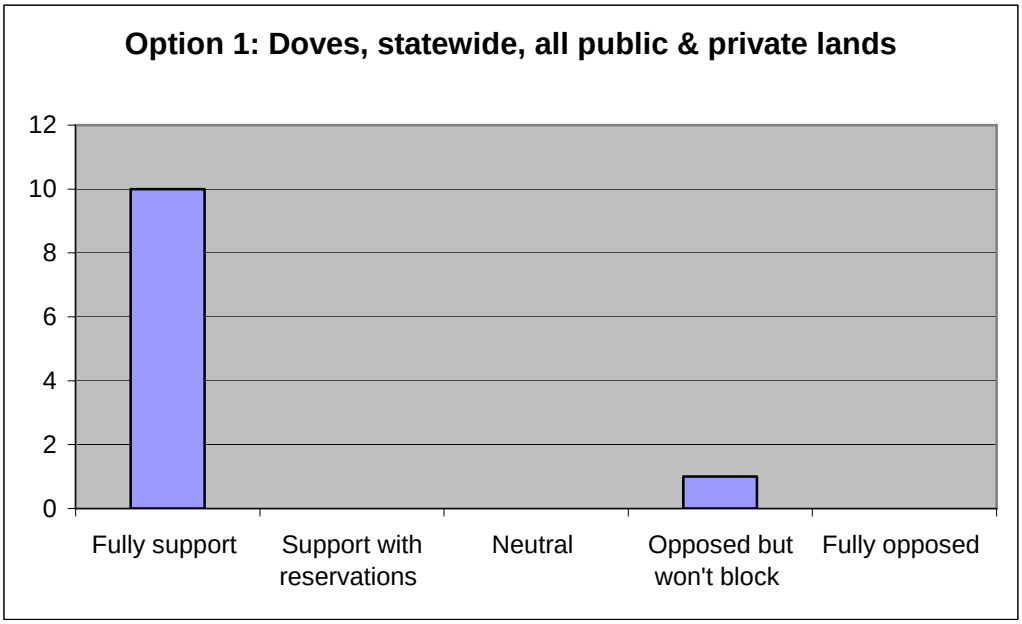
Regardless of future surveys or public education efforts, there will likely be some level of opposition for any or all restrictions that are considered or implemented. Given that lead shot is currently the least expensive option available commercially, restricting the use of lead shot will result in increased ammunition costs for hunters.

There are diverse opinions on whether there are equally effective and reasonably priced alternative nontoxic loads. However, there appears to be fewer alternatives for smaller gauge shotguns (i.e., .410 and 28 gauge) and hunters using these firearms will have more limited ammunition options and higher costs for alternative loads. It is not clear whether manufacturing advances may eventually produce more alternative nontoxic shot options for these smaller gauge shotguns.

Finally, ammunition dealers and hunters will have existing inventories of lead shot that may pose disposal challenges.

Mitigation strategies for all five options: It may be possible for DNR along with other as yet unidentified partners to offer a limited ammunition exchange of fine shot lead for fine shot steel. Additionally shotgun shooting skills courses could be incorporated into or offered separately as part of the Advanced Hunter Education programs. This would require that a number of instructors be taught the methods advocated by CONSEP and that they then offer multiple classes over a long period of time.

Option 1. Eliminate use of lead shot for doves, statewide, on all public and private lands.

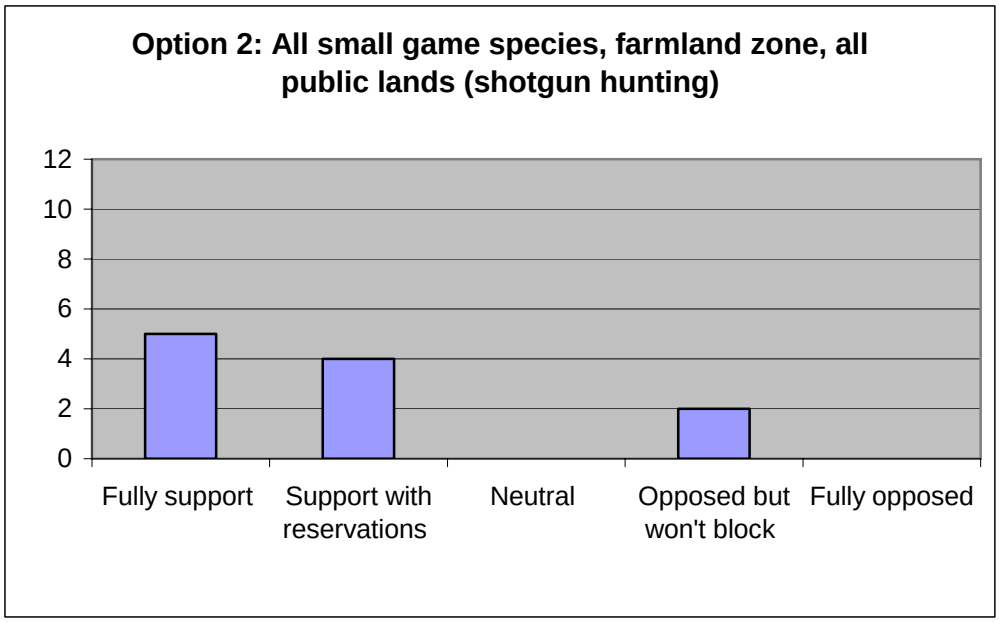


Advantages:
1) There is good documentation from other states that lead shot builds up in dove fields. This option addresses lead deposition in the environment.
2) Data presented in peer-reviewed literature are compelling regarding potential and actual effects of lead shot on mourning doves. Less evidence of lead shot ingestion exists for other species, particularly woodland birds.
3) Dove hunting is not well established; therefore, these changes are easiest to implement before a dove-hunting constituency grows.
4) Restrictions would affect the smallest number of hunters

Disadvantages:
1) Has the smallest overall net effect in reducing deposition of lead.
2) Enforcement confusion - It may be difficult to prove that a hunter carrying lead shot was intending to use it on doves; he/she could claim to be hunting another species.

Mitigation: None identified. This option will have a very small impact on the hunting public.

Option 2. Eliminate the use of lead shot for all small game species, farmland zone on all public lands (shotgun hunting).



Advantages:
1) Addresses geographic areas of greatest hunter concentration and deposition of lead.
2) Provides a defined land base and geographic area that allows hunters to easily understand and for Conservation Officers to enforce.
3) Avoids issues with hunter location confusion that may arise in forested areas (It's easier to know where you are in open places).

Disadvantages:
1) Doesn't address lead deposition on private lands.
2) May be the least legally defensible as it may give anti-lead groups claim that the state knows of the dangers of lead (i.e.. banning it on state land) but is not taking appropriate action (allowing its use on private land).

Mitigation:
1) Use roads to better define “farmland zone.” Note: Committee didn’t have definite boundary for this option. Farmland zone was later defined using major highways (see Figure 1).
2) Consider promoting voluntary compliance on private lands.

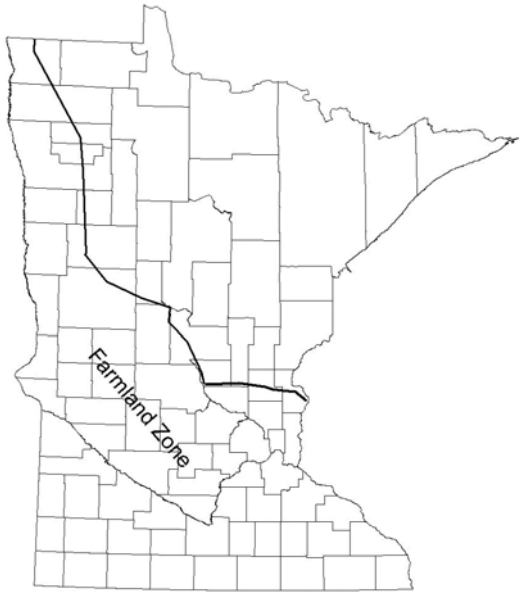
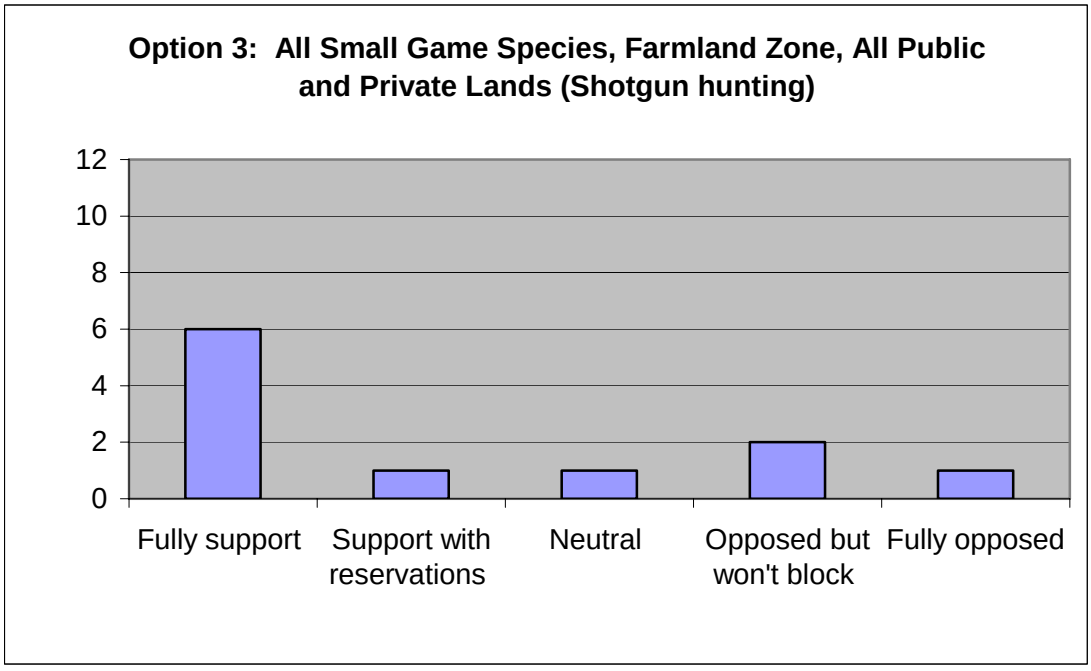


Figure 1. Generalized description of the farmland zone.

Option 3. Eliminate the use of lead shot for all small game species, in the farmland zone on all public and private land (shotgun hunting).

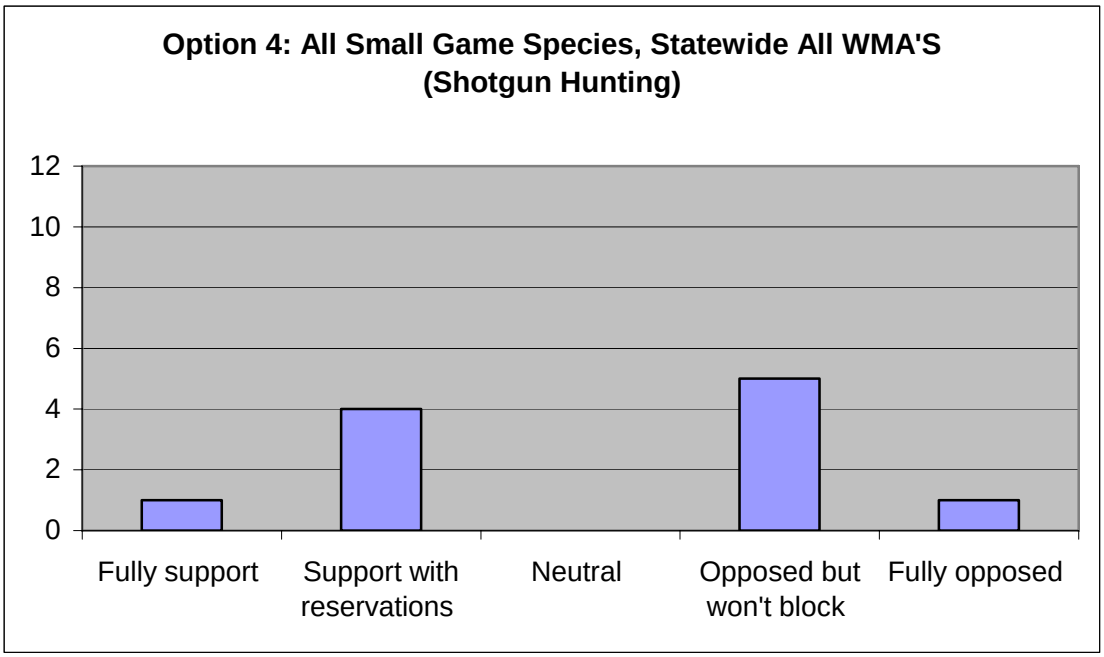


Advantages:
1) Easily understood by hunters.
2) Easy to enforce.
3) Addresses late season lead deposition in wetlands by pheasant hunters.
4) Addresses most compatibility (WPA's already require non-toxic shot) issues with WPA's (most WPA's are in the farmland zone in Minnesota).

Disadvantages:
1) Stops short of addressing the issue statewide.

Mitigation:
1) Phase in period.
2) Utilize a comprehensive and extensive educational program directed at hunters.

Option 4. Eliminate the use of lead shot for all small game species, statewide on all WMA's (shotgun hunting).



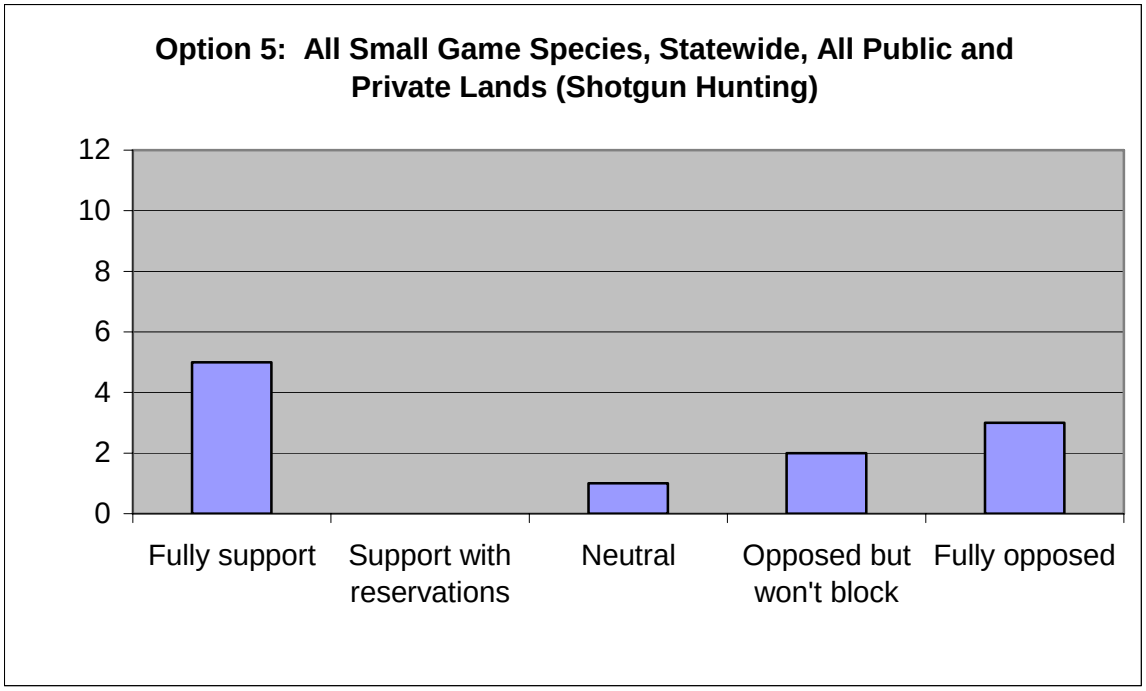
Advantages:
1) Easy for hunters to understand.
2) Hunters still have an option for using lead shot.
3) Closest to South Dakota precedent which restricts use of lead shot on all public lands.

Disadvantages:
1) Difficult for hunters to identify boundaries and for Conservation Officers to enforce boundaries in forested areas.
2) Doesn't address lead deposition on private lands.

3) Creates precedent for regulating method of take on WMA lands versus other public and private lands.

Mitigation:
1) Complete & maintain WMA boundary signage.
2) Consider promoting voluntary compliance on private lands.

Option 5. Eliminate the use of lead shot for all small game species, statewide, on all public and private lands (shotgun hunting).



Advantages:
1) Simple, minimizes confusion
2) Reaches the "inevitable" end or fundamental objective.
3) Most comprehensive
4) Most enforceable
5) Option may be most defensible in case of a state lawsuit.

Disadvantages:
1) Likely to generate the most opposition.
2) Greatest increased overall cost for hunters.
3) Longest time to implementation

Mitigation:
1) Utilize a comprehensive and extensive educational program directed at hunters.
2) Identify additional implementation phases if necessary.
3) Conduct survey to identify hunter behaviors and values.

4) Consider establishing a lead shot exchange program prior to full implementation.
5) Start with phasing in farmland zone first.

Discussion

Mitigation considerations for all five options: DNR can do little to mitigate economic impacts of higher ammunition costs although the economic impacts of restricting lead shot for small game hunting will hopefully be reduced through marketplace competition over time. However, the design and implementation of future lead shot restrictions can minimize other impacts for hunters, retailers, and manufacturers. For example, implementation schedules should allow ammunition dealers and manufacturers sufficient time to adjust inventories for the consumer. Implementation schedules should also consider lead shot inventories maintained by individual hunters by providing time for existing lead shot inventories to be disposed of, exchanged or used. Ammunition exchange programs may provide an incentive to individual hunters to transition to new loads.

Scientific Evidence: This report is not intended to be a comprehensive discussion of lead toxicosis. An annotated literature review is contained in Appendix II. However, there was considerable discussion among the Committee as to the state of the science, what it means, and what data is lacking. All members agreed that lead is toxic and that there are alternatives available. However, there was not agreement as to the extent and magnitude of the problem or what would be considered to be reasonable mitigation. This is a very gray area. All species of small game that occur in Minnesota are susceptible to lead poisoning. Although lethality tests have not been conducted on many species, lethal doses are likely a function of body weight and how the animal processes food. Granivorous birds with large muscular crops that efficiently grind seeds probably absorb lead faster and to a greater extent than carnivorous or herbivorous species. Furthermore, it has been documented that mourning doves actually select spent shot at a higher than expected rate which suggests that they are actually choosing to eat shot. However, with the exception of mourning doves that frequent heavily shot over managed dove fields, there is no "smoking gun" pointing to an immediate and acute detrimental effect being caused by spent lead shot in the environment. The effects are more insidious as they occur slowly over time and are difficult, if not impossible, as well as expensive to detect. Secondary poisoning may also be an issue. Birds that have ingested or been wounded by lead shot are more susceptible to predation. Predators may ingest lead from their prey and also become sickened. Again this is a gray area. It should, however, be pointed out that lawsuits regarding the secondary poisoning effects on bald eagles is what drove the Federal implementation of non-toxic requirements for waterfowl hunting.

As NSAC wrestled with inconclusive and unsatisfying data regarding the impacts of lead shot on small game species, two lines of thought eventually developed. There were those that were unconvinced by existing data and wanted additional research that directly links lead shot with wildlife health and/or population effects in Minnesota. Likewise, there were those that believed that lead is a toxic substance and given that there are viable alternatives, it is incumbent upon us to remove lead shot from hunting to the greatest extent possible. These two philosophies are reflected in the bimodal distributions of votes in Options 1, 2 and 4.

Human Health Effects: The effects on humans from the consumption of animals tainted with lead from being shot or having consumed lead as part of their diet are not well known. Studies from Inuit populations in Alaska (Gay, 2004) and villagers in Greenland (Johansen et.al, 2006) indicate that people who consume large numbers of birds killed with lead shot as a substantial part of their diet have elevated lead levels. The effects of these elevated levels have not been shown. Few humans are killed outright from lead poisoning in America although a recent case of fatal lead poisoning in a young boy in Minnesota demonstrates that it can happen. For the record it should be noted that the boy ate a lead trinket rather than lead shot. However, non-fatal lead levels may affect both adults and children. Lead may cause high blood pressure, kidney problems and nervous system damage in adults. Children are particularly sensitive to the effects of lead as they are smaller, their nervous systems are developing, and they have a higher rate of metabolism than adults. Lead has been documented to affect the learning and mental capabilities of children and there have been extensive efforts to remove lead from paint and gasoline for this reason. There have been discussions at the national level about lowering the "level of concern", or the level at which to recommend taking action. However, it is generally accepted by lead researchers that there is no "safe" level or threshold for effects of lead in children. The CDC Advisory Committee On Childhood Lead Poisoning Prevention (ACCLPP) has not recommended lowering the level of concern even though there is evidence of adverse effects of lead on children at levels less than the current level of concern. Minnesota tests large numbers of one and two year old children every year to monitor lead levels. It is unknown how much lead enters the systems of either children or adults from consuming lead tainted birds in Minnesota.

Small Bores: There was considerable discussion in the Committee meetings regarding small bores (.410 and 28 gauge). Current non-toxic options for small bores are limited and expensive. Due to technical difficulties related to shot cup capacity it is doubtful if steel (in its present form) will ever be a viable and inexpensive option for small bores. Furthermore, since demand for small-bore ammunition is relatively limited, manufacturers are currently not investing substantially in the research necessary to develop new alternatives. This will remain the situation for the foreseeable future. NSAC discussed allowing exemptions or additional implementation time for small bores but ultimately decided not to make such a recommendation. This decision was based upon: (a) the limited demand and relatively few hunters affected, and (b) the determination that it is unlikely that new alternatives will be available in the foreseeable future.

Species Specific vs. Geographic and Ownership Based Regulations: With the exception of mourning doves, for which the best scientific data exists for supporting species-specific regulations, NSAC chose not to use a species-specific approach for a variety of reasons. Perhaps the primary reason is the difficulty of enforcement of non-toxic regulations in the field. For example, if non-toxic shot is required to hunt "species A" but not "species B" and a hunter is found to be in possession of lead during the open season for "species A" is he hunting "species A" or not? Species-specific regulations would only be enforceable when hunters are found to possess both lead shot and a bird regulated under a lead shot prohibition. Even in that case, the bird may need to be necropsied to determine what type of shot killed it in order to determine if the hunter was complying with the lead shot restrictions. This situation is unenforceable in the

field. There are also issues with perceived fairness. If dove hunters are required to change shouldn't pheasant hunters also be required to change, at least when hunting in the same areas?

In general, NSAC believed that although more lead is deposited on public lands (due to extensive use), there are private lands that are hunted just as hard as some public lands and that if lead deposition is an important issue on public lands then it is also an important issue on private lands. However, some NSAC members believed that regulations on private lands may be unpalatable to many hunters and reflected their beliefs in shaping the Options and in their votes (particularly on Options 3 and 5). Generally the sentiment was that the public is not ready for such broad sweeping regulations as a total ban on both public and private lands at this time. However, some members argued that the regulation should apply to both public and private land and that it was in fact more understandable and easier to enforce. Furthermore, regulating the method of take differently on public versus private land, although not without precedent, is an unusual practice for Minnesota DNR.

Timing of Implementation: Once DNR has decided on what regulations will be implemented, sufficient time needs to be given to hunters, manufacturers and retailers to adapt. It will not serve anybody to implement new regulations too quickly. Manufacturers need lead time to produce sufficient quantities of smaller nontoxic shot loads to meet the new needs of hunters affected by the regulation. The time required is dependent upon the scope and breadth of the regulation. For instance, a dove fields only regulation would require no lead-time as the number of dove hunters in Minnesota is small and existing capacity can meet the demand. Conversely, a regulation that affected all upland hunters would require up to six seasons of lead-time so that new machinery can be purchased (if necessary) and changeovers can be accomplished. Steel is not loaded using the same machines as lead. Retailers would likewise need some period of time to turn over existing stocks and lay in new supplies. Large sporting goods retailers turn their ammunition stocks over fairly quickly and would thus be able to respond with as little as a single season's notice (to allow for ordering of inventory). Smaller retailers, that do not do a high volume business, would need longer. Finally, hunters need to be given sufficient time to use up existing supplies of shells. Not allowing sufficient time for this would simply anger the hunting public and accomplish very little to reduce lead in the environment in the long run.

NSAC agreed that a statewide ban (public and private lands) on the use of lead for dove hunting could conceptually be implemented in two seasons, whereas a total ban for shotgun hunting of all small game (public and private lands) would take approximately six seasons for implementation. However, these timelines are based upon the capabilities of manufacturers, retailers, and hunters to respond and not necessarily linked to their willingness to accept new regulations.

Regardless of the regulation, an implementation schedule needs to be developed that takes into account both the time necessary to generate public acceptance through an education campaign as well as ammunition consumption rates. NSAC recommends that once DNR decides upon regulation changes, a strong communications plan be implemented to inform the public and that DNR work closely with the industry to give as much advance notice as possible.

Recommendations for a Public Education/Communication Plan

NSAC completed an exercise with Jason Abraham, FAW Information Officer, to develop an overview for an education/communication plan. This "communications blue print" frames the issue, potential problems or opportunities, objectives, target audiences, current and desired knowledge and attitudes, information sources, main messages, and communication tools.

Situation Analysis

- Lead is a toxic substance to both humans and wildlife and simply not required for life.
- It is inevitable that lead shot will have to be restricted for all shotgun hunting at some future time.
- The NSAC report is proactive and demonstrates leadership in dealing with this issue.

Potential issues

- There will be objections to further restrictions on use of lead shot.
- Non-hunting stakeholders may draw attention to toxic effects of lead shot and its continued use by hunters.
- There will be no simple answers or mitigation solutions for some hunters.
- Litigation in other states may influence schedules for implementation.
- There may be potential negative impacts for hunter recruitment due to ammunition cost, shot effectiveness, age of introduction, negative reactions (e.g., recoil with large bores).
- Research may be beneficial for demonstrating the need for changing existing policies and regulations especially for small game mammals. Different levels of proof may be needed for different stakeholders.
- Hunters and businesses need enough notice to adjust their lead shot inventory.

Objectives (What do we want to accomplish with our communications?)

- Demonstrate leadership in addressing this issue.
- Slowly begin building consensus among stakeholders that further lead shot restrictions are acceptable.
- Give hunters and businesses enough notice to adjust their lead shot inventory.
- Clearly explain nontoxic shot requirements to hunting stakeholders.
- Clearly explain requirements to reduce enforcement issues.
- Provide concrete examples for changing to other loads (e.g., different shooting techniques, disposal of stored shot, etc.).

Specific audiences we need to reach

- Hunting stakeholders
    - Small game license purchasers
    - Dove, pheasant, grouse hunters
    - Firearms safety instructors and new hunters
    - Nonresident small game hunters
    - Dealers, distributors, and manufacturers (national and local)
    - Big game hunters
    - Wild turkey hunters

- Hunters with English as a second language
- Outdoors media
- Hunting preserves
- Guides
- Shooting range operators
- Legislature

- Non-hunting stakeholders
  - Agricultural community
  - Wildlife watchers
  - Environmental organizations (e.g., Audubon, Sierra Club)
  - Legislature

Current and Desired Knowledge or Attitudes

Current Knowledge or Attitudes	*Desired Knowledge or Attitudes*
Hunting stakeholders	
o Restrictions should have been done earlier. o Lead shouldn't be banned. o There was a commitment in the past (circa 1980's) that DNR would not go beyond lead shot restrictions in waterfowl. o Hunters do not directly observe dead birds or evidence of the toxic effect of lead on wildlife populations. o There is a lack of awareness on nontarget species.	o There is a need to change; this is reasonable, rational, and responsible. o Change is needed because: (a) lead is toxic, (b) conservationists need to be proactive, and (c) this is not "anti-hunting." o Responsible hunters use nontoxic shot. o This is part of a logical progression to remove lead in society.
o A large group of hunters are uninformed on the issue. o Some ammunition box and shell labels do not clearly indicate that they contain lead . Labeling on shells wears off with handling. o Hunters believe that steel shot is ineffective. o Hunters believe that steel loads will harm shotguns.	o This is not an attempt to hurt hunting or related sectors; this is being done to preserve our hunting heritage. o Steel is an effective alternative. o Steel won't damage modern firearms.
Non-hunting stakeholders	
o People are afraid of anything "toxic." o There is a lack of familiarity with hunting equipment and supplies (e.g., shells versus bullets). o The hunting community is resistant to change.	o Hunters are being proactive and doing the right thing. o This is not an attempt to hurt hunting or related sectors; this is being done to preserve our hunting heritage. o There is a need to change; this is reasonable, rational, and responsible.

How do we reach our audiences

- Hunting stakeholders (examples)
    - Outdoor News, Star Tribune, Pioneer Press
    - Pheasants Forever Magazine
    - Websites – corporate, government, conservation groups, hunting bulletin boards
    - DNR *Hunting Synopsis*, DNR *Volunteer*, other DNR resources
    - Retailers, gunsmiths, etc.
    - Newsletters
    - Sportsmen club activities
    - Radio (e.g. KFAN, etc)
    - Firearm safety and advanced hunter education
    - National sporting publications
    - Professional Outdoors Media Association (POMA), AGLOW, etc.
- Nonhunting stakeholders (examples)
    - Loon or Minnesota Birding
    - Metro/State sections of mainstream newspapers
    - MOU Paper Session and other club meetings
    - DNR *Volunteer*
    - Ecological Services Roundtable constituents

Main Messages

- Lead is toxic and we have effective alternatives.
- What is being proposed is reasonable, rational, and responsible.
- These changes are being done to be proactive and preserve our hunting heritage.
- These changes are being phased in over a period of time.
- An education campaign will continue during a phase-in period.
- These changes will not be easy nor without personal impacts.

Methods of message delivery

- Print media (news releases)
- Presentations at grass-roots sportsmen club meetings
- Radio and tv PSAs
- Demonstrations
- Celebrity spokesperson
- 4H and other youth programs
- Word of mouth
- Power Point presentations distributed and given by DNR staff, organizations; available on the Internet
- Print advertisements or fillers

Knowledge Gaps and Potential Research Needs

Over the course of five meetings, NSAC identified several knowledge gaps and potential research needs pertaining to the impact of lead on human health, impacts of lead shot restrictions on hunter participation rates, and future availability of nontoxic loads.

Impact of Lead Ingestion Related to Hunting on Humans

- Identify states, provinces, or countries that have restricted the use of lead shot due to potential impacts on human health.
- Determine blood lead levels of human populations that ingest game taken with lead shot

Hunter Participation Rates

- Potential impacts of increased ammunition costs on hunter recruitment and retention

Ammunition

- Potential future availability of nontoxic loads (especially for small bores)
- Lethality for some species (e.g. Mourning Doves)

Conclusions

Deciding when, where, and what future nontoxic shot regulations for upland shotgun hunting should be is very complex and must be done in a data poor environment. There is insufficient data to clearly determine which wildlife species are being impacted by lead and to what extent although there is a significant body of literature that attempts to address the issue. Finding the "smoking gun" would be extremely expensive and perhaps not even feasible with the research tools that we have available to us today. The best data that we have comes from studies recently completed in Missouri that show that mourning doves, in captive trials, select lead shot at a rate greater than would be expected if they were merely ingesting it randomly. Furthermore, it only takes a few lead pellets to kill a dove. A single pellet may make a dove moribund so that it succumbs to secondary mortality effects such as predation. However, even with this evidence it is difficult to estimate what the overall population effects might be. Given the lack of hard evidence, NSAC was unable to reach consensus on a preferred ultimate solution.

In addition to biological and population level concerns there are many social factors involved in implementing nontoxic shot regulations. NSAC had robust conversations regarding the technical issues surrounding creating relatively inexpensive (e.g. steel) loads for small bores, lethality of nontoxic alternatives, human health concerns, impacts on hunter recruitment and retention, species vs. geographic vs. ownership regulations, hunters' current knowledge and understanding of the issue as well as their willingness to accept new regulations and a host of other related topics. Based upon these discussions, NSAC was able to reach consensus that: 1) DNR should begin to regulate lead shot on managed dove fields (which was implemented in 2006) and, 2) for shotgun hunting in general, implement regulations that are more restrictive than current state and federal regulations. We were not, however, able to reach consensus on how far additional

regulations should go. We were able to develop a set of seven guiding principles that we believe are both significant and useful in evaluating current and future potential options. These include:

1. Lead is toxic to both humans and wildlife and simply is not required for life.

2. Representing a wide diversity of backgrounds (e.g., conservationists, retailers, manufacturers, biologists, human health experts, etc.) NSAC recommendations will be proactive and demonstrate leadership in dealing with this issue.

3. Phase-in periods will be utilized for implementing final recommendations.

4. Recommended hunting regulations will be simple, understandable, and enforceable.

5. A state constitutional amendment was approved by 77.2% of voters in 1998 that guarantees the right to hunt and fish. Specifically this amendment states "*hunting and fishing and the taking of game and fish are a valued part of our heritage that shall be forever preserved for the people and shall be managed by law and regulation for the public good*." NSAC seeks to maintain hunting in Minnesota in a sustainable manner while fulfilling its charge to identify options for the use of lead shot for hunting.

6. Recommendations need to recognize the impacts of potential restrictions on the use of lead shot and accommodate or mitigate these impacts.

7. It is inevitable that lead shot will have to be restricted for all shotgun hunting at some future time.

NSAC was able to scope down the list of nearly 40 potential regulatory options to five that seemed to make sense for further consideration by DNR. Because consensus could not be reached, NSAC chose to go to a levels of agreement model where each member voted along a continuum from fully support to fully opposed based upon their comfort level with a give option. The options were not a stepwise progression for implementation but rather were independent of each other. The level of agreement votes are shown graphically in the figures contained within this report. NSAC believes that the levels of agreement on the scoped down options will help to inform and guide DNR as they move forward in this difficult process.

Whatever sort of regulations DNR ultimately decides to move forward with, they need to be easily understandable, easily enforceable, implemented with an adequate phase in period and generally acceptable to hunters. Communications will be key in reaching these goals and a significant up-front communications effort by DNR could save significant time and generally make this a positive experience (or at least neutral) for most hunters. To this end, a communications plan outline is included in the report.

The Nontoxic Shot Advisory Committee would like to take this opportunity to thank DNR for taking this issue on in a timely and open manner. We appreciate the opportunity to represent the positions of our respective organizations and to work with technical experts to develop what we believe is a proactive and hopefully useful approach for DNR as it moves forward in addressing this important topic.

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Appendix I. Nontoxic Shot Regulation Inventory of the United States and Canada

Report to the
Ad Hoc Mourning Dove and Lead Toxicosis Working Group

Non-Toxic Shot Regulation Inventory of the United States and Canada

Final Report
August 2006

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Introduction

In January 2006, the Fish and Wildlife Health Committee of the Association of Fish and Wildlife Agencies created an Ad Hoc Mourning Dove and Lead Toxicosis Working Group (Dove Working Group). The Dove Working Group conducted a survey in July 2006 to inventory states/provinces about the current status of non-toxic shot regulations for waterfowl hunting beyond regulations required by federal laws. Additionally, the inventory sought information about current status of non-toxic shot regulations for migratory gamebirds, and/or upland gamebirds. The survey was conducted by D.J. Case & Associates (DJ Case).

Methods

Survey Tool

DJ Case and the Dove Working Group utilized a web-based survey for cost- and time-efficiency. Using questions provided by the Dove Working Group as a basis, DJ Case created an online survey (Appendix A). The questionnaire was branched so that respondents were asked only questions that pertained to them, according to responses provided in earlier questions. Figure 1 (on Page 4) displays the progression of questions in the survey.

Survey Distribution

The survey was distributed to Flyway Council representatives for all 50 states, all 10 Canadian provinces, and 2 Canadian territories (Northwest Territories and Yukon Territories) for a total distribution of 62 surveys. The Dove Working Group supplied email addresses for each of the Flyway Council representatives. The Flyway Council representatives were invited to contribute to the inventory, or assign another representative within the state/province to do so, via an invitation email (Appendix B) on July 5, 2006. Twenty-five responses were received by the time the reminder email (Appendix C) was sent on July 11, 2006. The reminder email triggered 18 additional responses. Beginning July 18, 2006, Jeff Ver Steeg, Dove Working Group representative, and DJ Case began follow-up phone calls to non-respondents. These phone calls prompted responses from 13 more respondents for a total of 56 responses, an 90% response rate (Table 1). The online survey was closed on July 24, 2006, with some telephone-administered surveys continuing until July 28, 2006. The contacts for each state/province are presented in Appendix D.

Table 1. Response to Nontoxic Shot Regulations Survey

	Number of Responses	Response Rate
Initial Invitation	25	40%
Reminder Invitation	18	29%
Follow-up Phone Calls	13	21%
Total	56	90%

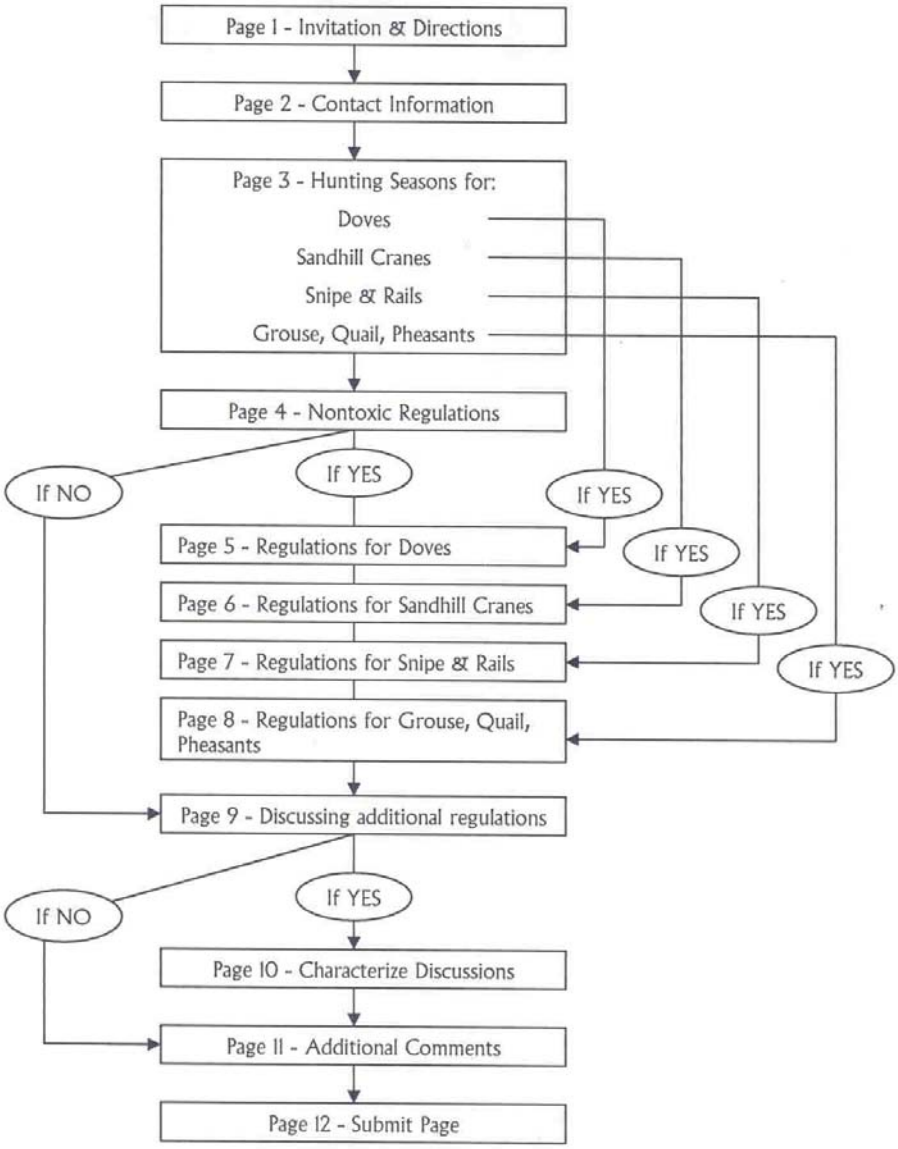


Figure 1. Questionnaire page progression for online survey (see Appendix A for screen shots of each survey page)

Results

Non-toxic Shot Regulations

Forty-five percent (n=26) of the responding states/provinces have non-toxic shot regulations beyond those required by federal law for waterfowl hunting.

Nine states/provinces that currently have non-toxic shot regulations are in the process of discussing additional regulations. Alaska, California, Illinois, Kansas, Louisiana, Michigan, and Washington indicated that they have had informal discussions regarding additional non-toxic shot regulations, but have no plans for implementing new regulations at this time. Minnesota indicated formal discussion, but no plans for recommendations at this time. Missouri has had formal discussions and draft plans for additional regulations are being considered.

Seventeen states/provinces currently have regulations for non-toxic shot, and are not discussing additional regulations at this time.

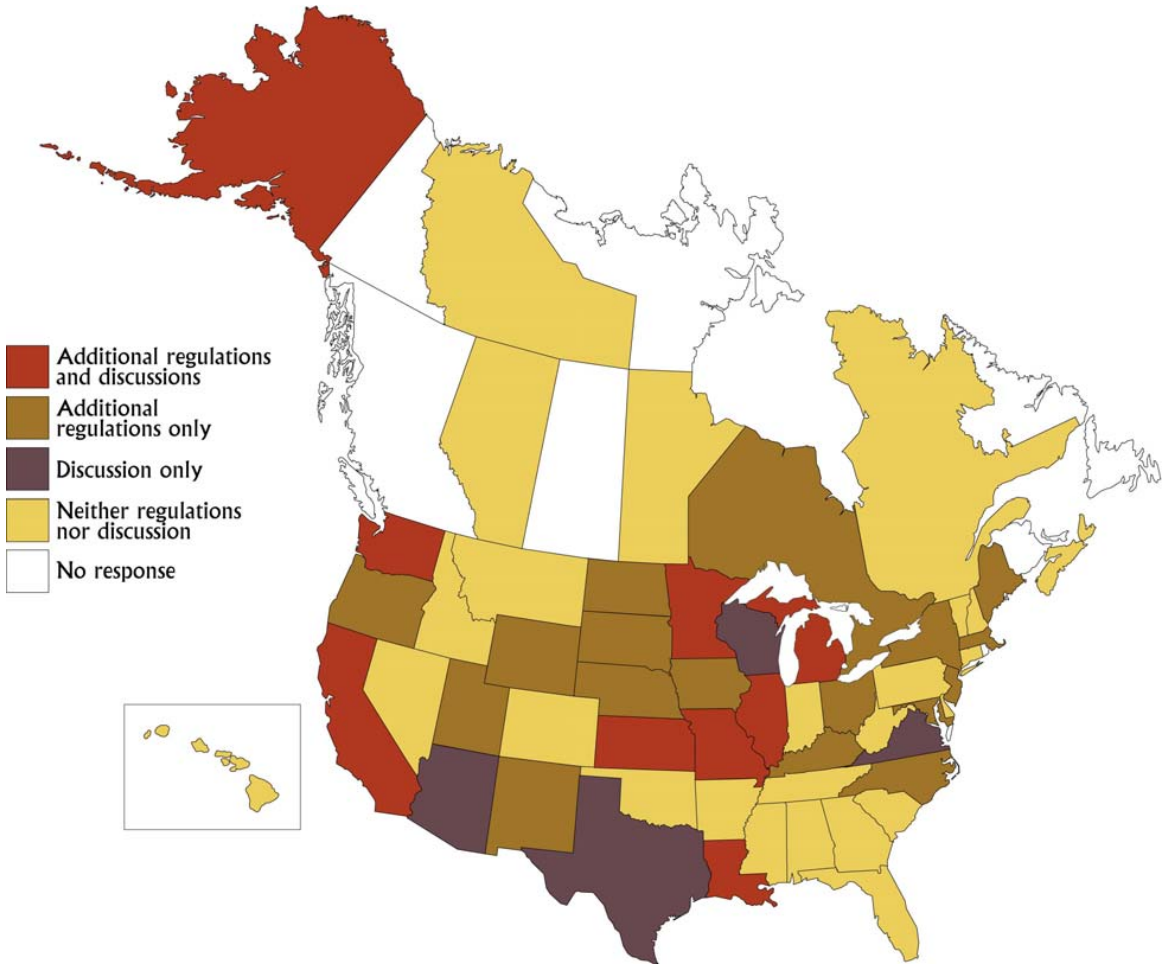


Figure 2. Map of states/provinces that have non-toxic shot regulations in addition to those required for waterfowl and those that are having discussions to implement additional nontoxic shot regulations.

Table 2. States/Provinces with hunting seasons (S) and non-toxic shot regulations in addition to those federally required for waterfowl (A) for dove, crane, rail, snipe, grouse, quail and pheasant species.

State/Province	Dove	Crane	Rail	Snipe	Grouse	Quail	Pheasant
Alabama	S		S	S		S	
Alaska		SA		SA	SA		
Alberta				S	S		S
Arizona	S	S		S	S	S	S
Arkansas	S		S	S		S	
California	SA			SA	SA	SA	SA
Colorado	S	S	S	S	S	S	S
Connecticut			S	S	S	S	S
Delaware	S		S	S		S	S
Florida	S		S	S		S	
Georgia	S		S	S	S	S	
Hawaii	S					S	S
Idaho	S	S		S	S	S	S
Illinois	SA		SA	SA		SA	SA
Indiana	S		S	S	S	S	S
Iowa			SA	SA	SA	SA	SA
Kansas	SA	SA	SA	SA	SA	SA	SA
Kentucky	SA		S	S	S	S	
Louisiana	SA		SA	SA		S	
Maine			S	S	S	S	S
Manitoba		S		S	S		
Maryland	S		SA	SA	S	S	S
Massachusetts			S	S	S	S	S
Michigan			SA	SA	S	S	S
Minnesota	SA		S	S	S		S
Mississippi	S		S	S		S	
Missouri	SA		SA	SA	SA	SA	SA
Montana	S	S		S	S		S
Nebraska	SA		SA	SA	SA	SA	SA
Nevada	S		S	S	S	S	S
New Hampshire				S	S	S	S
New Jersey			SA	SA	S	S	S
New Mexico	SA	SA	SA	SA	SA	SA	SA
New York			SA	SA	S	S	S
North Carolina	SA		SA	SA	SA	SA	SA
North Dakota	S	SA		SA	S		S
Northwest Territories					S		
Nova Scotia				S	S		S
Ohio	S		SA	SA	S	S	S
Oklahoma	S	S	S	S		S	S
Ontario			SA	SA	S		S
Oregon	SA			SA	SA	SA	SA
Pennsylvania	S		S	S	S	S	S
Quebec				S	S	S	S
Rhode Island	S		S	S	S	S	S
South Carolina	S		S	S	S	S	
South Dakota	SA	SA		SA	SA	SA	SA
Tennessee	S		S	S	S	S	
Texas	S	S	S	S		S	S
Utah	SA	SA		SA	SA	SA	S
Vermont				S	S	S	S
Virginia	S		S	S	S	S	S
Washington	SA			SA	SA	SA	SA
West Virginia	S		S	S	S	S	S
Wisconsin	S		S	S	S	S	S
Wyoming	SA	SA	SA	SA	SA		SA
Total w/ Hunting Seasons	40	14	38	54	46	46	44
Total w/ Additional Regulations	15	7	14	22	13	12	12

Four states/provinces do not currently have non-toxic shot regulations beyond waterfowl hunting, but are in the process of discussing regulations. Both Texas and Wisconsin indicated that officials have had formal discussions regarding non-toxic shot regulations, but have no plans to currently move forward with regulations at this time. Arizona indicated that officials have had informal discussions, and are currently considering draft regulations. Virginia indicated that officials have had informal discussions, but have no plans at this time.

Twenty-six states/provinces indicated that they have neither additional non-toxic shot regulations nor are they formally or informally discussing future implementation.

Species-Specific Hunting Regulations

Respondents were asked to indicate what classifications of gamebirds are hunted in their state, and indicate whether non-toxic shot regulations apply to those species. (Table 2). Additionally, states/provinces were asked to indicate if regulations apply to public and/or private land (Table 3). While Massachusetts does not have any of the specified species in regulations, the state/province does have non-toxic shot requirements for coot hunting (as noted in the open-ended responses in Appendix E).

Table 3. Extent to which non-toxic hunting regulations apply for state/province and privately owned land by species (displaying only states/provinces with non-toxic shot regulations). Blanks indicate lack of a hunting season for that species in the state/province.

	Dove		Crane		Snipe and/or Rail		Grouse, Quail, and/or Pheasant	
State/Province	State	Private	State	Private	State	Private	State	Private
Alaska			All	All	All	All	Some	Some
California	Some	None			Some	None	Some	None
Illinois	Some	None			All	All	Some	None
Iowa					All	All	Some	None
Kansas	Some	None	All	All	All	All	Some	None
Kentucky	Some	None			None	None	None	None
Louisiana	Some	None			Some	None	None	None
Maine					All	All	None	None
Maryland	None	None			All	All	None	None
Massachusetts					None	None	None	None
Michigan					All	All	None	None
Minnesota	Some	None			None	None	None	None
Missouri	Some	None			Some	None	Some	None
Nebraska	Some	None			Some	None	Some	None
New Jersey					All	All	None	None
New Mexico	Some	None	Some	Some	All	All	Some	None
New York					All	All	None	None
North Carolina	Some	None			Some	None	Some	None
North Dakota	None	None	All	All	All	All	None	None
Ohio	None	None			All	All	None	None
Ontario					All	All	None	None
Oregon	Some	None			Some	None	Some	None
South Dakota	All	None	All	All	All	All	All	None
Utah	Some	None	All	All	Some	None	Some	None
Washington	Some	Some			Some	Some	Some	Some
Wyoming	Some	None	Some	None	Some	None	Some	None

Dove Hunting Regulations

Of the 40 states/provinces that offer a dove hunting season, 15 have non-toxic shot regulations for dove hunting on all or some state/province owned or managed land. Washington has non-toxic shot regulations for dove hunting on some, but not all, private land (Table 4).

California, Illinois, Kentucky, Minnesota, and Wyoming have restrictions on some or all managed wildlife areas, while New Mexico has non-toxic shot restrictions on all Game Department properties (Appendix E). North Carolina requires the use of non-toxic shot in waterfowl impoundments, regardless of the species hunted (aside from buckshot).

Table 4. Non-toxic shot regulations on state/province owned or managed areas and private lands for dove hunting. This question was asked of only those states/provinces that had dove hunting and nontoxic shot regulations. (Percentages are rounded to the nearest integer)

	State/province Lands		Private Lands	
	n	%	n	%
All	1	6%	0	0%
Some	14	78%	2	11%
None	3	17%	16	89%
Total	18	100%	18	100%

Sandhill Crane Hunting Regulations

While fourteen states/provinces offer a sandhill crane hunting season, seven of these states/provinces have non-toxic regulations for this season. Five states/provinces have a statewide (all state/province and privately owned land) regulation for non-toxic shot when hunting crane. New Mexico has some state and some private land restricted to non-toxic shot when crane hunting. Wyoming's restriction is only on some state-owned land (Table 5).

New Mexico has non-toxic shot restrictions in the eastern portion of the state/province only on Department managed wildlife areas, but non-toxic shot must be used in the western portion of the state/province on both public and private lands.

Table 5. Non-toxic shot regulations on state/province owned or managed areas and private lands for sandhill crane hunting. This question was asked of only those states/provinces that had sandhill crane hunting and non-toxic shot regulations. (Percentages are rounded to the nearest integer)

	State/province Lands		Private Lands	
	n	%	n	%
All	5	71%	5	71%
Some	2	29%	1	14%
None	0	0%	1	14%
Total	7	100%	7	100%

Snipe and Rail Hunting Regulations

Of the 54 states/provinces that have a snipe and/or rail hunting season, 23 states/provinces have non-toxic shot regulations related to hunting these species on state/province owned or Non-Toxic Shot Regulations Inventory managed land. Fifteen states/provinces have non-toxic shot regulations for snipe and/or rail hunting on private land (Table 6).

New Mexico and New York indicated that snipe and rail are lumped into the statewide nontoxic shot regulation for hunting waterfowl. North Carolina and Louisiana both indicated that snipe hunting in waterfowl impoundments requires non-toxic shot.

Table 6. Non-toxic shot regulations on state/province owned or managed areas and private lands for snipe and/or rail hunting. This question was asked of only those states/provinces that had snipe and/or rail hunting and non-toxic shot regulations. (Percentages are rounded to the nearest integer)

	State/province Lands		Private Lands	
	n	%	n	%
All	14	54%	14	54%
Some	9	35%	1	4%
None	3	12%	11	42%
Total	26	100%	26	100%

Grouse, Quail, and Pheasant Hunting Regulations

All responding states/provinces have grouse, quail, and/or pheasant hunting seasons. While South Dakota had non-toxic shot regulations for grouse, quail, and/or pheasant hunting on all state/province owned or managed land, 13 states/provinces have these regulations on some state/province land. Alaska and Washington have non-toxic shot regulations for grouse, quail, and/or pheasant hunting on some private lands (Table 7).

Similar to previous comments, New Mexico, North Carolina, and Utah commented that nontoxic regulations apply to these species only when hunting in waterfowl management areas.

Table 7. Non-toxic shot regulations on state/province owned or managed areas and private lands for grouse, quail, and/or pheasant hunting. This question was asked of only those states/provinces that had grouse, quail, and/or pheasant and non-toxic shot regulations. (Percentages are rounded to the nearest integer)

	State/province Lands		Private Lands	
	n	%	n	%
All	1	4%	0	0%
Some	13	50%	2	8%
None	12	46%	24	92%
Total	26	100%	26	100%

Conclusions

Non-toxic shot regulations, beyond those required for waterfowl, are currently present in nearly half (46%) of the 56 responding states/provinces. The use of those regulations varies by species and whether a person is hunting on private or state/province land.

Fourteen states/provinces had at least some non-toxic shot regulations on either state/province or private lands for all of the hunting seasons that they offer and are explored in this survey.

In summary, non-toxic shot regulations were more wide-spread for hunting seasons for species whose habitat coincides with waterfowl species (crane, snipe, and rail), and to a lesser extent doves. The upland birds (grouse, quail, and pheasant) are less regulated for non-toxic shot (Figure 3a-d).

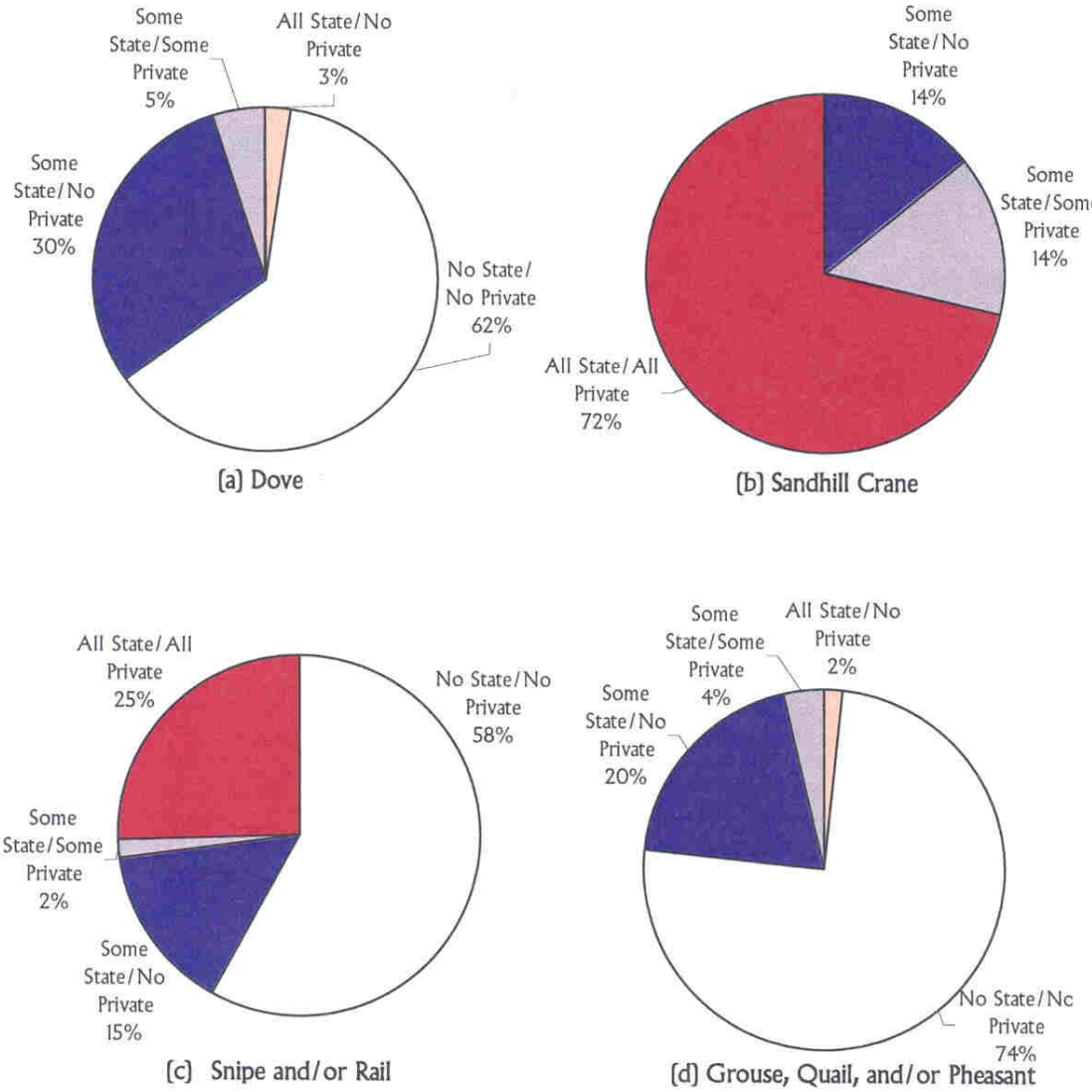
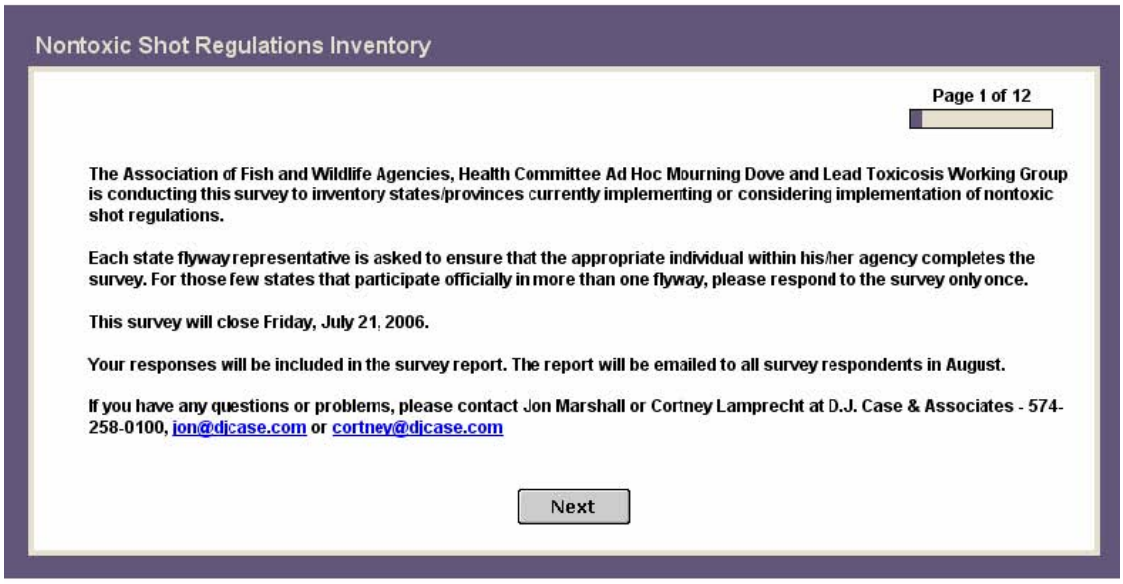
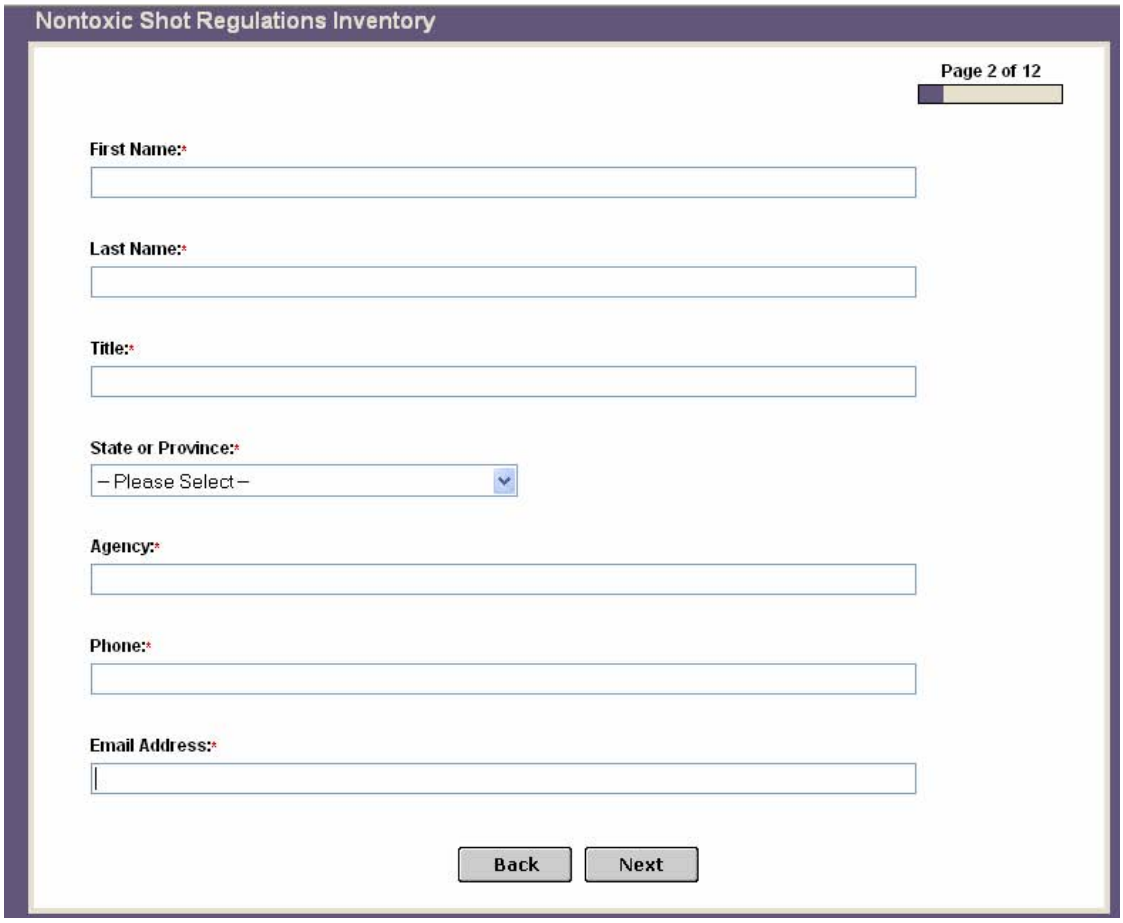


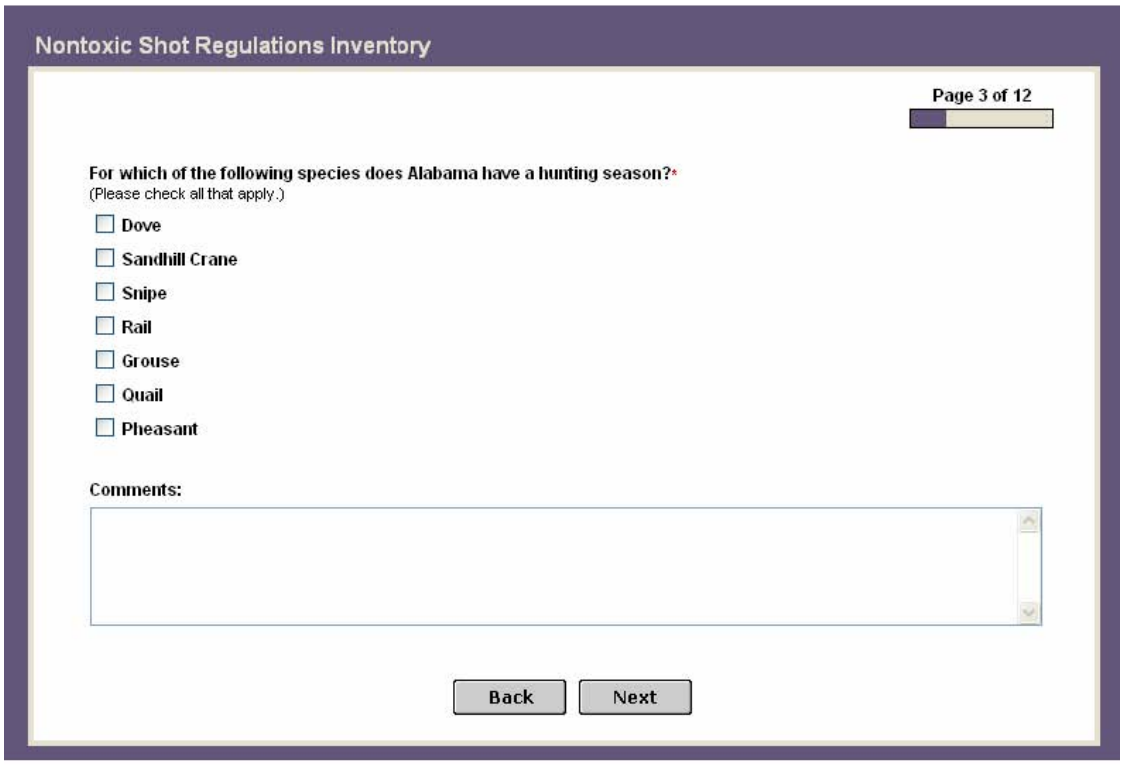
Figure 3(a-d). Distribution of non-toxic shot regulations in addition to those required federally for waterfowl by landownership (state or private) for states that offer a dove season (a), sandhill crane season (b), snipe and/or rail seasons (c), and grouse, quail, and/or pheasant seasons (d).

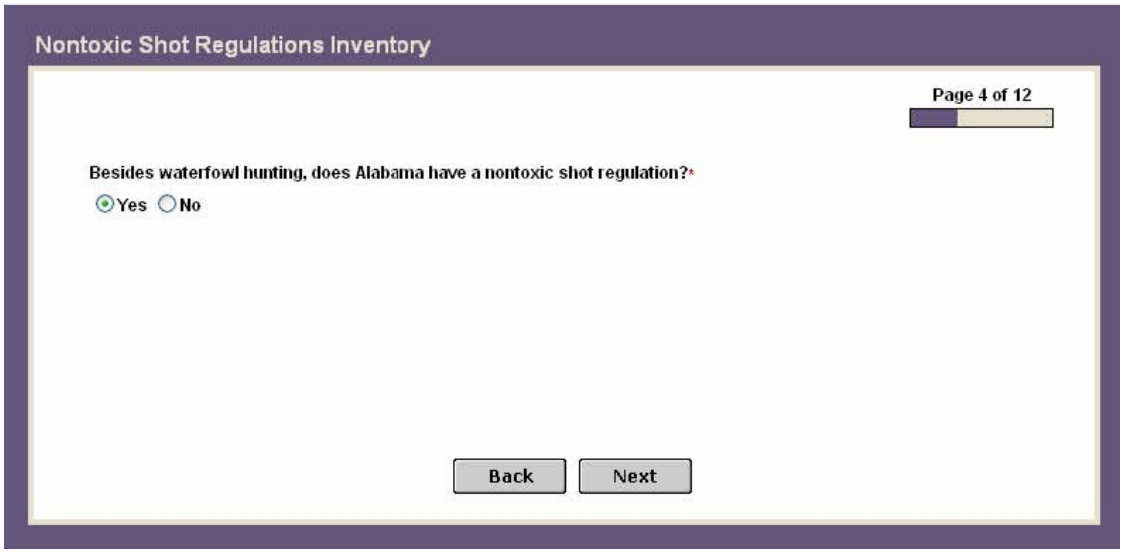
Appendix A: Survey Item Pool

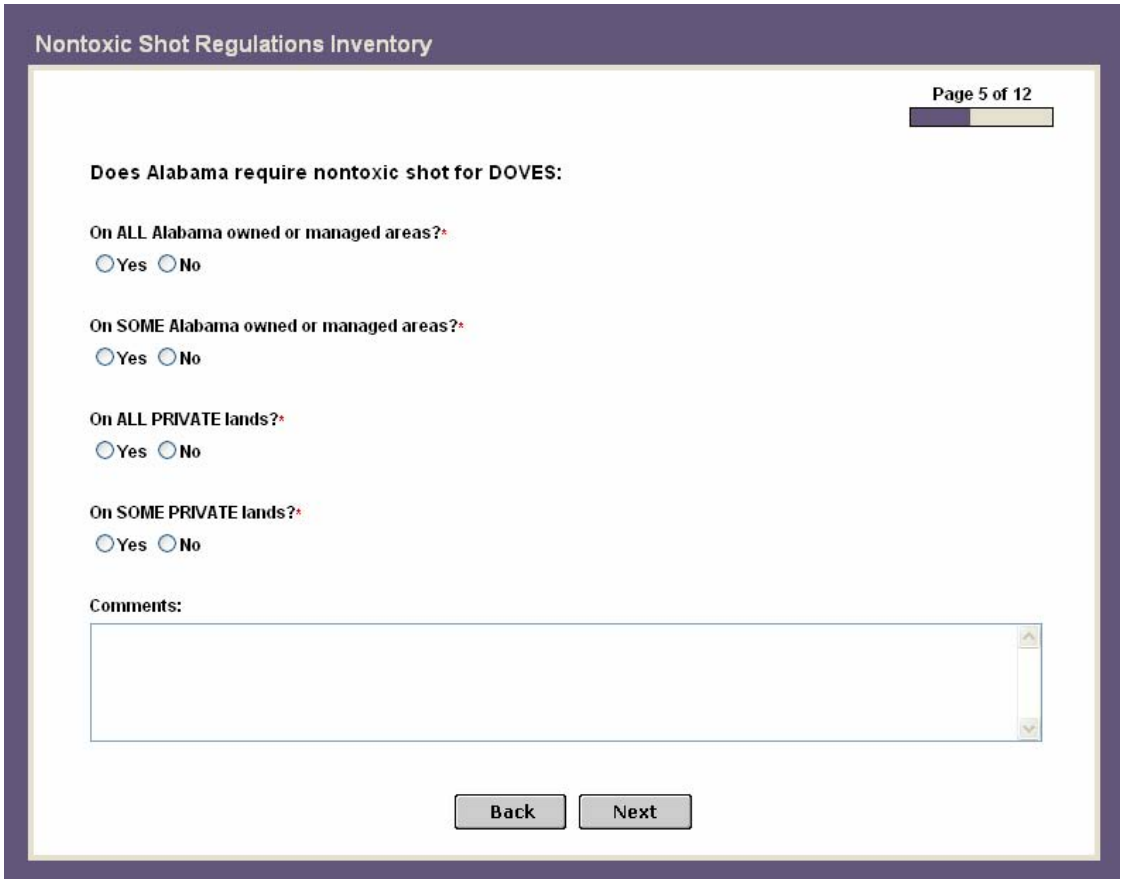


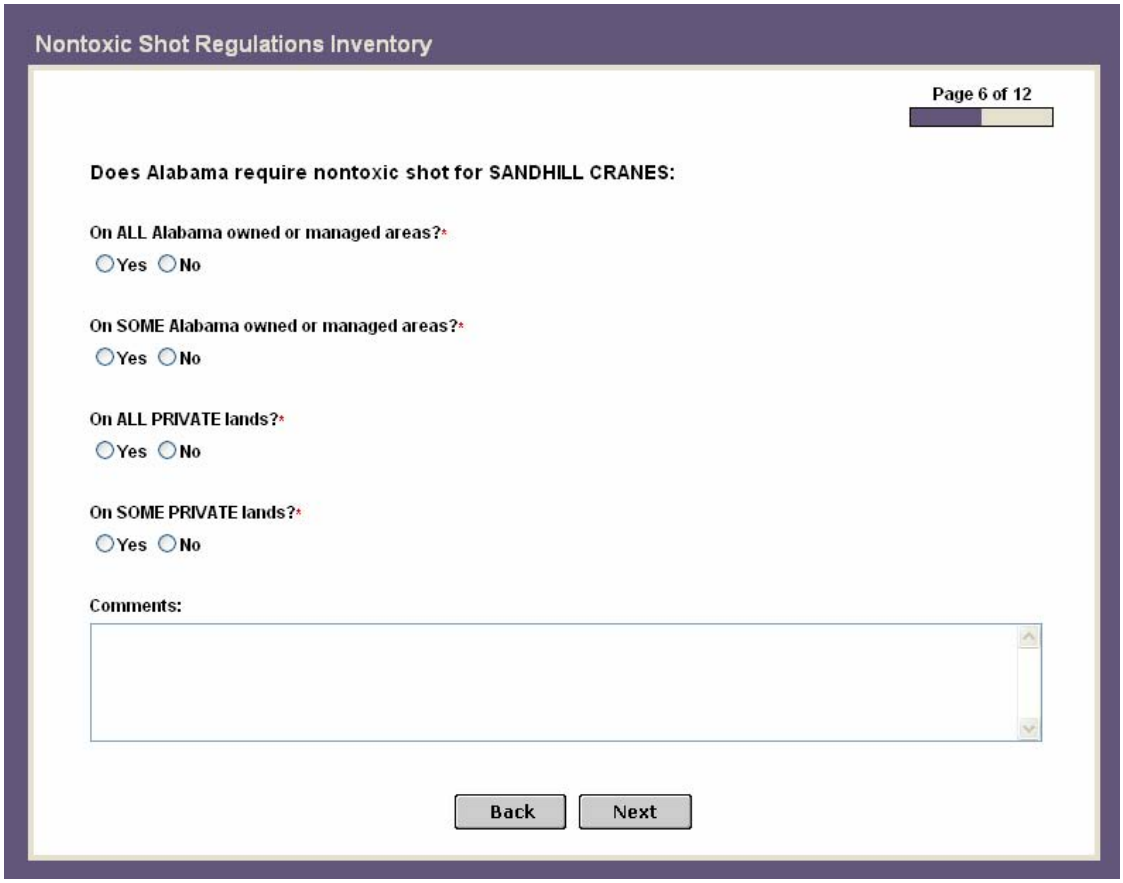


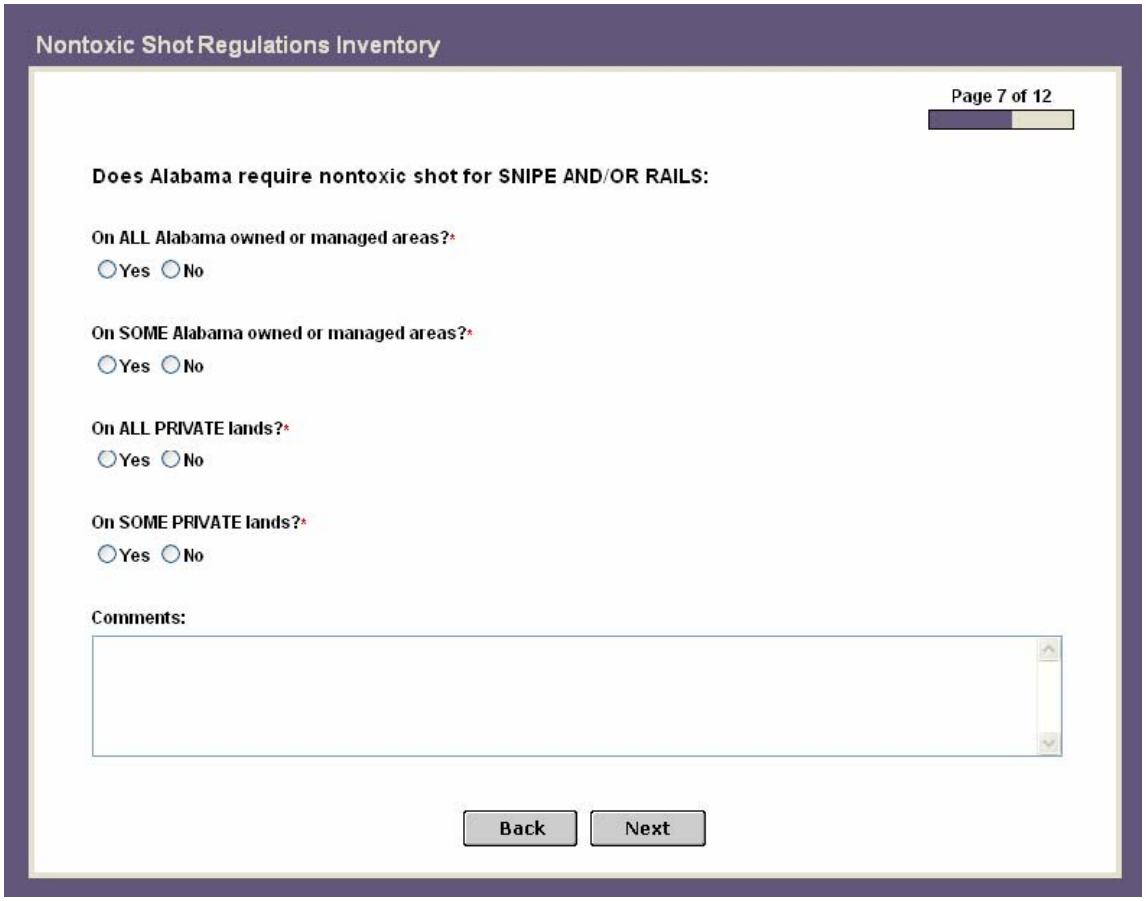
Appendix A: Survey Item Pool

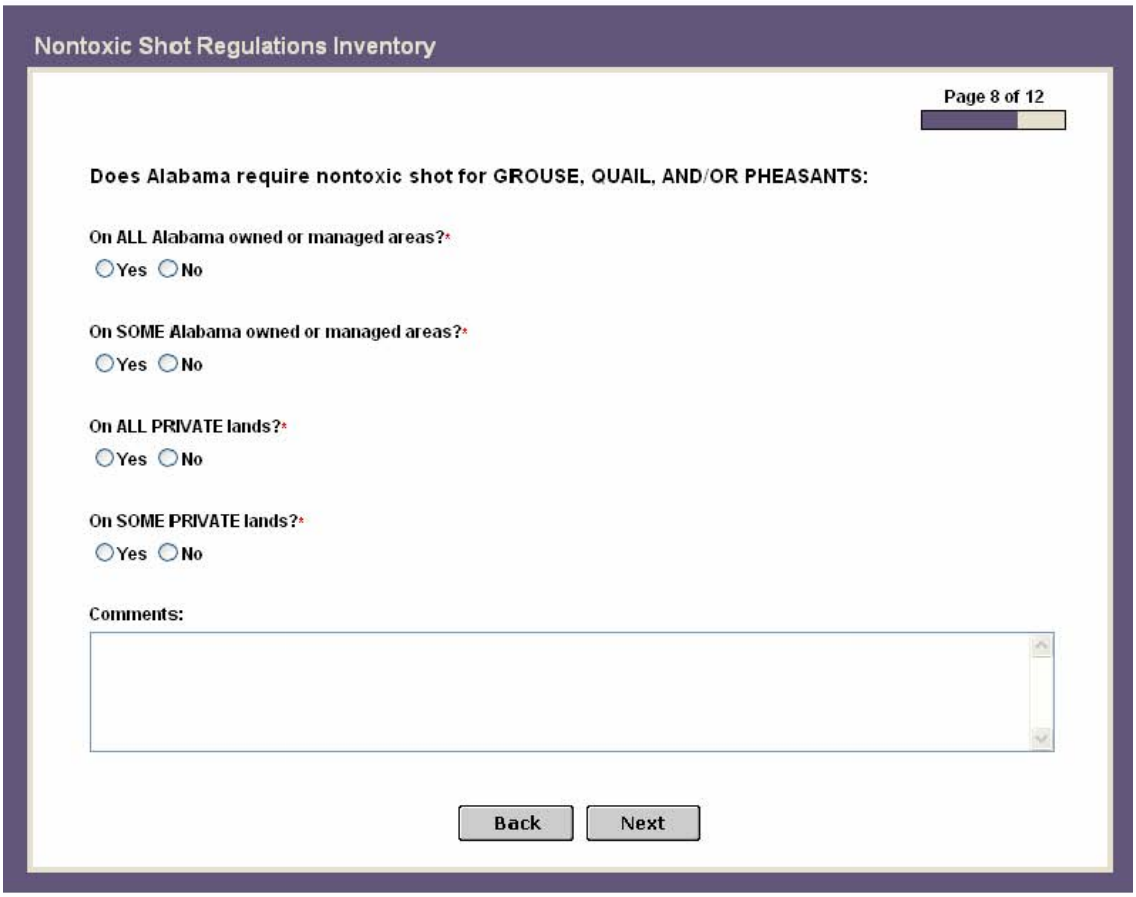


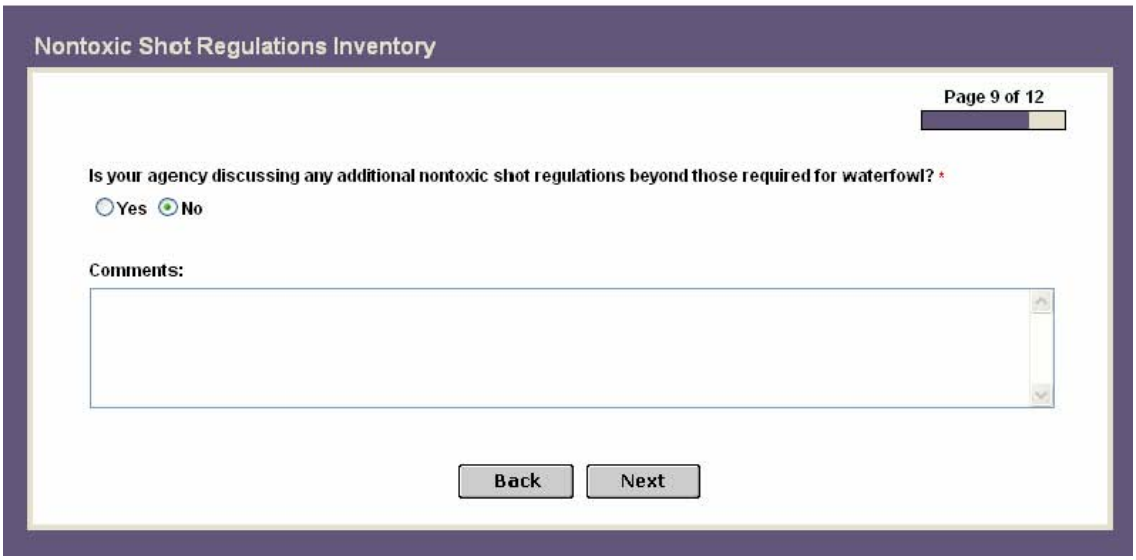


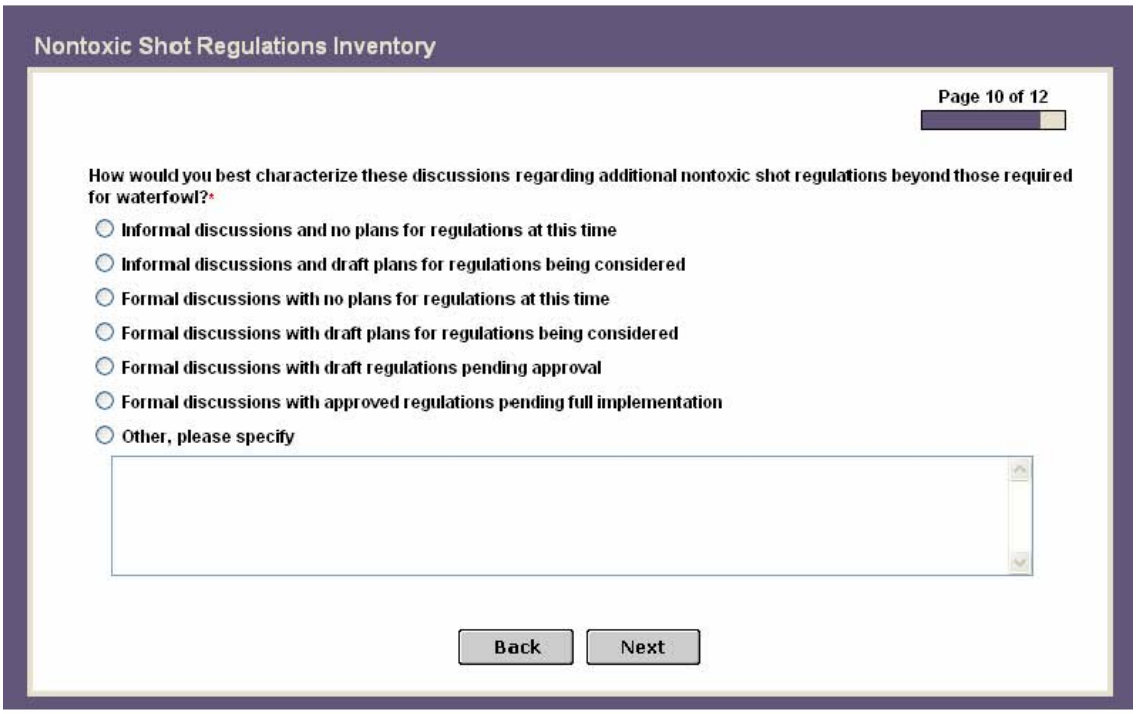

Nontoxic Shot Regulations Inventory
Page 5 of 12
Does Alabama require nontoxic shot for DOVES:
On ALL Alabama owned or managed areas?*
Yes No
On SOME Alabama owned or managed areas?*
Yes No
On ALL PRIVATE lands?*
Yes No
On SOME PRIVATE lands?*
Yes No
Comments:
Back
Next

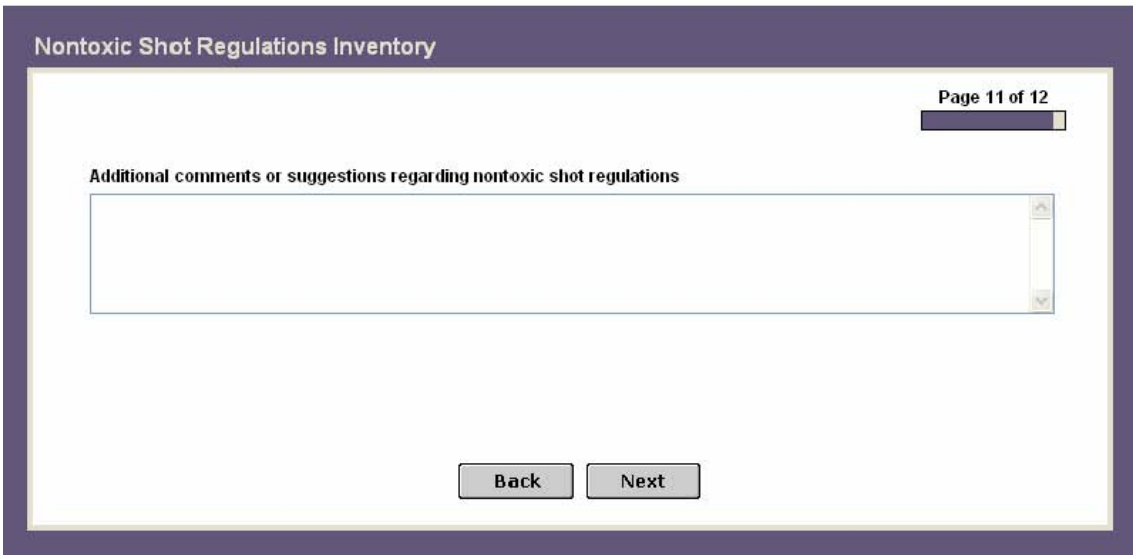

Nontoxic Shot Regulations Inventory
Page 6 of 12
Does Alabama require nontoxic shot for SANDHILL CRANES:
On ALL Alabama owned or managed areas?*
Yes No
On SOME Alabama owned or managed areas?*
Yes No
On ALL PRIVATE lands?*
Yes No
On SOME PRIVATE lands?*
Yes No
Comments:
Back
Next


Nontoxic Shot Regulations Inventory
Page 7 of 12
Does Alabama require nontoxic shot for SNIPE AND/OR RAILS:
On ALL Alabama owned or managed areas?*
Yes No
On SOME Alabama owned or managed areas?*
Yes No
On ALL PRIVATE lands?*
Yes No
On SOME PRIVATE lands?*
Yes No
Comments:
Back
Next


Nontoxic Shot Regulations Inventory
Page 8 of 12
Does Alabama require nontoxic shot for GROUSE, QUAIL, AND/OR PHEASANTS:
On ALL Alabama owned or managed areas?*
Yes No
On SOME Alabama owned or managed areas?*
Yes No
On ALL PRIVATE lands?*
Yes No
On SOME PRIVATE lands?*
Yes No
Comments:
Back
Next


Nontoxic Shot Regulations Inventory
Page 9 of 12
Is your agency discussing any additional nontoxic shot regulations beyond those required for waterfowl? *
Yes No
Comments:
Back
Next


Nontoxic Shot Regulations Inventory
Page 10 of 12
How would you best characterize these discussions regarding additional nontoxic shot regulations beyond those required for waterfowl?*
Informal discussions and no plans for regulations at this time
Informal discussions and draft plans for regulations being considered
Formal discussions with no plans for regulations at this time
Formal discussions with draft plans for regulations being considered
Formal discussions with draft regulations pending approval
Formal discussions with approved regulations pending full implementation
Other, please specify
Back
Next


Nontoxic Shot Regulations Inventory
Page 11 of 12
Additional comments or suggestions regarding nontoxic shot regulations
Back
Next


Nontoxic Shot Regulations Inventory
Page 12 of 12
If you are satisfied with the answers you have submitted, click the "Done" button.
You may select the "Back" button if you would like to change any of your answers.
Back
Done

Appendix B: Invitation to Survey – Distributed July 5, 2006

This message was sent from D.J. Case & Associates on behalf of Jeff VerSteeg.

Dear <First Name>,

The Association of Fish and Wildlife Agencies, Health Committee Ad Hoc Mourning Dove and Lead Toxicosis Working Group is conducting this survey to inventory states/provinces currently implementing or considering implementation of nontoxic shot regulations.

Each state flyway representative is asked to ensure that the appropriate individual within his/her agency completes the survey. For those few states that participate officially in more than one flyway, please respond to the survey only once.

Your responses will be included in the survey report. The report will be emailed to all survey respondents in August.

The link to the survey is:
http://www.djcase.com/selectsurvey/TakeSurvey.asp?EID=52MB631B865BH4pBM5oBM2LB2KM

If you have any questions or problems, please contact Jon Marshall or Cortney Lamprecht at D.J. Case & Associates - 574-258-0100,jon@djcase.com or cortney@djcase.com

Your cooperation is greatly appreciated. Thank you.

Sincerely,
Jeffrey M. Ver Steeg
Chairman, Ad Hoc Mourning Dove and Lead Toxicosis Working Group and Chairman, Central Flyway Council

Appendix C: Reminder Invitation to Survey – Distributed July 11, 2006

Dear <First Name>,

We have not yet received information from D.J. Case & Associates regarding nontoxic shot regulations.

The Association of Fish and Wildlife Agencies, Health Committee Ad Hoc Mourning Dove and Lead Toxicosis Working Group is conducting this survey to inventory states/provinces currently implementing or considering implementation of nontoxic shot regulations.

Each state flyway representative is asked to ensure that the appropriate individual within his/her agency completes the survey.

Please follow the link below to include D.J. Case & Associates information in this inventory. The deadline for submissions is July 21.

Your responses will be included in the survey report. The report will be emailed to all survey respondents in August.

The link to the survey is:

http://www.djcase.com/selectsurvey/TakeSurvey.asp?EID=52MB631B865BJ7lBM5oBM2MB2KM

If you have any questions or problems, please contact Jon Marshall or Cortney Lamprecht at D.J. Case & Associates - 574-258-0100,jon@djcase.com or cortney@djcase.com.

Your cooperation is greatly appreciated. Thank you.

Sincerely, Jeffrey M. Ver Steeg
Chairman, Ad Hoc Mourning Dove and Lead Toxicosis Working Group and Chairman, Central Flyway Council

Appendix D: Survey Respondents

State/Province	Agency	Name	Title	Phone	Email Address
Alabama	Dept. of Cons. and Nat. Res., Division of Wildlife and Freshwater Fisheries	David Hayden	Asst. Chief, Wildlife Section	334-242-3469	David_Hayden@dcnr.alabama.gov
Alaska	Alaska Department of Fish and Game	Matt Robus	Director, Div. of Wildlife Conservation	907-465-4190	matt_robus@fishgame.state.ak.us
Alberta	Fish and Wildlife Division, Alberta Sustainable Resource Development	Ken Lungle	Provincial Bird Game Specialist	780-415-8145	ken.lungle@gov.ab.ca
Arizona	Arizona Game and Fish Department	Mike Rabe	Migratory Game Birds Supervisor	602-789-3353	mrabe@azgfd.gov
Arkansas	Arkansas Game and Fish Commission	Luke Naylor	Waterfowl Program Coordinator	501-223-6361	lwnaylor@agfc.state.ar.us
California	California Department of Fish and Game	Tom Blankinship	Senior Biologist/ Supervisor	916-445-3615	TBlankin@dfg.ca.gov
Colorado	Colorado Division of Wildlife	Brett Ackerman	Regulations Coordinator	303-291-7278	brett.ackerman@state.co.us
Connecticut	Connecticut Department of Environmental Protection	Edward Parker	Bureau Chief	860-424-3010	edward.parker@po.state.ct.us
Delaware	Delaware Division of Fish and Wildlife	Kenneth Reynolds	Program Manager II	302-653-2883	kenneth.reynolds@state.de.us
Florida	Florida Fish and Wildlife Conservation Commission	Nick Wiley	Director, Division of Hunting and Game Management	850-488-3831	nick.wiley@myfwc.com
Georgia	GA DNR-Wildlife Resources Division	Donald McGowan	Senior Wildlife Biologist	770-918-6416	Don_McGowan@dnr.state.ga.us
Hawaii	Division of Forestry & Wildlife/Department of Land & Natural Resources	Ed Johnson	wildlife biologist/state hunting coordinator	808-587-4185	Edwin.D.Johnson@hawaii.gov
Idaho	Idaho Department of Fish and Game	Tom Hemker	State Waterfowl Biologist	208-287-2749	themker@idfg.idaho.gov
Illinois	Illinois Department of Natural Resources	John Buhnerkempe	Chief, Division of Wildlife Resources	217-785-2511	john.buhnerkempe@illinois.gov
Indiana	Indiana Dept. of Natural	Adam Phelps	Waterfowl Research	812-334-1137	aphelps@dnr.in.gov

Appendix D: Survey Respondents

State/Province	Agency	Name	Title	Phone	Email Address
	Resources, Division of Fish and Wildlife		Biologist		
Iowa	Iowa Department of Natural Resources	Dale Garner	Wildlife Bureau Chief	515-281-6156	dale.garner@dnr.state.ia.us
Kansas	Kansas Department of Wildlife and Parks	Joe Kramer	Director of Fisheries and Wildlife	620-672-0790	joek@wp.state.ks.us
Kentucky	KY Department of Fish and Wildlife Resources	Rocky Pritchert	Migratory Bird Program Coordinator	502-564-7109 x495	rocky.pritchert@ky.gov
Louisiana	Louisiana Department of Wildlife and Fisheries	Mike Olinde	Wildlife Division Research Program Manager	225-765-2353	molinde@wlf.louisiana.gov
Maine	Maine Department of Inland Fisheries and Wildlife	Brad Allen	Bird Group Leader	207-941-4469	brad.allen@maine.gov
Manitoba	Manitoba Conservation	Ken Green	Legislative Specialist	204-945-7749	kgreen@gov.mb.ca
Maryland	Department of Natural Resources, Wildlife and Heritage Service	Bill Harvey	Game Bird Section Leader	410-221-8838 x108	bharvey@dnr.state.md.us
Massachusetts	Massachusetts Division of Fisheries & Wildlife	Thomas O'Shea	Assistant Director for Wildlife	508-792-7270 x128	tom.o'shea@state.ma.us
Michigan	Michigan Department of Natural Resources, Wildlife Division	Michael Bailey	Species Habitat Section Supervisor	517-241-0533	baileyme@michigan.gov
Minnesota	Department of Natural Resources	Bill Penning	Farmland Wildlife Program Leader	651-259-5230	bill.penning@dnr.state.mn.us
Mississippi	MS Dept. of Wildlife, Fisheries, and Parks	Larry Castle	Chief of Wildlife	601-432-2300	Larryc@mdwfp.state.ms.us
Missouri	Missouri Department of Conservation	John Schulz	Resource Scientist	573-882-9909 x3218	John.H.Schulz@mdc.mo.gov
Montana	Fish Wildlife and Parks	Don Childress	Administrator Wildlife Div	406-444-5645	dchildress@mt.gov
Nebraska	Nebraska Game and Parks Commission	Scott Taylor	Wildlife Research, Analysis and Inventory Section Leader	402-471-5439	scott.taylor@ngpc.ne.gov

Appendix D: Survey Respondents

State/Province	Agency	Name	Title	Phone	Email Address
Nevada	Nevada Department of Wildlife	Russ Mason	Game Bureau Chief	775-688-1520	rmason@ndow.org
New Hampshire	Fish and Game Department	Edward Robinson	Waterfowl Project leader	603-271-2461	erobinson@wildlife.state.nh.us
New Jersey	New Jersey Division of Fish and Wildlife	Paul Castelli	Research Scientist II	609-748-2047	pcastelli@icdc.com
New Mexico	NM Dept. of Game & Fish	Tim Mitchusson	Game Bird Programs Manager	505-835-0900	tim.mitchusson@state.nm.us
New York	New York State Division of Fish, Wildlife & Marine Resources	Gordon Batcheller	Small Game Section Leader	518-402-8885	grbatche@gw.dec.state.ny.us
North Carolina	NC Wildlife Resources Commission	David Cobb	Chief, Division of Wildlife Management	919-707-0051	david.cobb@ncwildlife.org
North Dakota	North Dakota Game and Fish Department	Mike Szymanski	Migratory Game Bird Biologist	701-328-6360	mszymanski@nd.gov
Northwest Territories	Environment and Natural Resources	Dave Williams	Manager Compliance	867-873-7905	dave_williams@gov.nt.ca
Nova Scotia	Nova Scotia Department of Natural Resources	Randy Milton	Manager, Wildlife Resources - Wetlands and Coastal Habitats Program	902-679 - 6224	miltongr@gov.ns.ca
Ohio	Ohio Division of Wildlife	Dave Risley	Executive Administrator, Wildlife Management and Research	614-265-6331	dave.risley@dnr.state.oh.us
Oklahoma	Oklahoma Department of Wildlife Conservation	Alan Peoples	Chief, Wildlife Division	405-521-2739	apeoples@odwc.state.ok.us
Ontario	Ontario Ministry of Natural Resources	Patrick Hubert	Senior Avian Biologist - Policy Advisor	705-755-1932	patrick.hubert@mnr.gov.on.ca
Oregon	Oregon Department of Fish and Wildlife	Brandon Reishus	Assistant Game Bird Biologist	503-947-6324	brandon.s.reishus@state.or.us
Pennsylvania	Pennsylvania Game Commission	John Dunn	Supervisor Game Bird Section	771-776-7337	johdunn@state.pa.us
Quebec	Natural resources and	Gaston Cayer	Wildlife protection	418-627-8691	gaston.cayer@fapaq.gouv.qc.ca

Appendix D: Survey Respondents

State/Province	Agency	Name	Title	Phone	Email Address
	Wildlife Department		officer		
Rhode Island	RI Division of Fish and Wildlife	Jay Osenkowski	Wildlife Biologist	401-789-0281	jay.osenkowski@dem.ri.gov
South Carolina	SC Department of Natural Resources	John Frampton	Director	803-734-4007	framptonj@dnr.sc.gov
South Dakota	South Dakota Department of Game, Fish and Parks	George Vandel	Assistant Director, Technical Services	605-773-4192	george.vandel@state.sd.us
Tennessee	Tennessee Wildlife Resources Agency	Roger Applegate	Small Game Coordinator	615-781-6616	Roger.Applegate@state.tn.us
Texas	Texas Parks and Wildlife Department	Vernon Bevill	Small Game & Habitat Assessment Program Director	512-389-4578	vernon.bevill@tpwd.state.tx.us
Utah	Utah Division of Wildlife Resources	Tom Aldrich	Migratory Game Bird Program Coordinator	801-538-4789	tomaldrich@utah.gov
Vermont	Vermont Department of Fish and Wildlife	William Crenshaw	Wildlife Scientist III	802-879-5699	bill.crenshaw@state.vt.us
Virginia	Virginia Department of Game and Inland Fisheries	Gary Costanzo	Migratory Game Bird Manager	757-592-7946	gary.costanzo@dgif.virginia.gov
Washington	Washington Dept. of Fish and Wildlife	Don Kraege	Waterfowl Section Manager	360-902-2522	kraegdkk@dfw.wa.gov
West Virginia	WV Division of Natural Resources	Steve Wilson	Wildlife Biologist	304-637-0245	stevewilson@wvdnr.gov
Wisconsin	WI Dept of Natural Resource	Kent Van Horn	Migratory Game Bird Ecologist	608-834-1334	Kent.VanHorn@dnr.state.wi.us
Wyoming	Wyoming Game and Fish Department	John Emmerich	Deputy Director	307-777-4501	john.emmerich@wgf.state.wy.gov

Appendix E: Open-Ended Responses

Comments Regarding Hunting Seasons (Page 3)

Colorado	Dove - Mourning, White-winged and Eurasian Collared Sandhill Crane Snipe - Wilson's Rail - Sora, Virginia Grouse - Dusky, Greater Sage, Mountain Sharp-tailed Quail - Northern Bobwhite, Scaled, Gambel's, Ring-necked Pheasant
Kansas	Kansas Grouse are Greater Prairie Chicken and Lesser Prairie Chicken
Nebraska	Grouse includes greater prairie-chickens and sharp-tailed grouse.
New Mexico	include band-tailed pigeon
Wisconsin	Dove season began in 2003

Comments Regarding Non-toxic Shot for Dove Hunting (Page 5)

Illinois	The Illinois Department of Natural Resources requires nontoxic shot on 40 managed dove hunting sites or 60% of the total sites hunted. The public dove hunting areas that require nontoxic shot are determined through a set of guidelines for requiring nontoxic shot for non-waterfowl hunting programs. The focus of these guidelines, however, is not doves but the potential for lead poisoning in waterfowl and/or threatened or endangered species (federal or state). These guidelines also consider converting sites to nontoxic shot if there is documentation that at least two cases of lead poisoning have been documented in one or more wildlife species. These guidelines can be provided upon request.
Kentucky	Dove hunting only on WMA's with wetland complexes.
Minnesota	2006 will be the first year where we require Non-toxic shot on posted managed dove fields on state Wildlife Management Areas. This is also our first year of developing managed dove fields on WMAs. This will affect only about 18 acres.
Nebraska	Also on some federal (USFWS) lands.
New Mexico	All Game Dept. owned properties require Nontoxic shot. This requirement doesn't apply to state school trust lands or state parks.
North Carolina	We have a rule that specifies that "[n]o person shall hunt with or have in their possession any shotgun shell containing lead or toxic shot while hunting on any posted waterfowl impoundment on any game land ... except that buckshot may be used while deer hunting." This rule applies to any hunting except deer with buckshot. So if someone is dove hunting within the boundary of a posted waterfowl impoundment, they must use nontoxic shot. This situation is not common.
North Dakota	Non-toxic shot is required on USFWS Waterfowl Production Areas
South Dakota	Our restrictions by rule are as follows: SDR 41:06:04:05.01 Nontoxic shot areas for small game. The use of nontoxic shot is required for all small game hunting on all state game production areas, lake and fishing access areas, state park system areas, U.S. Army Corps of Engineers land, Bureau of Reclamation Wildlife Production Areas managed by the department, U.S. Fish and Wildlife Service National Wildlife Refuges, and U.S. Fish and Wildlife Service Waterfowl Production Areas; and lead shot may not be possessed while hunting small game on these areas. Lake and fishing access areas include public water access areas designated by the department. and, SDR 41:03:01:16.04 Nontoxic shot areas for target shooting - Exceptions. With the exception of those areas posted by the department as exempt from this section, the use of nontoxic shot is required for all target shooting with shotguns on all state game production areas, lake and fishing access areas, state park system areas, U.S. Army Corps of Engineers Wildlife Production Areas managed by the department and U.S. Bureau of Reclamation Wildlife Production Areas managed by the department. Lake and fishing access areas include public water access areas designated by the department.

Comments Regarding Non-toxic Shot for Sandhill Crane Hunting (Page 6)

New Mexico	Nontoxic shot is required for Dept. managed areas and federal NWR for the regular season on the east side of the state. Hunters on private lands, state land or BLM may use toxic shot. Special permit crane hunts for the Middle Rio Grande Valley, Estancia Valley and Southwest areas require Nontoxic shot on all lands, private and public.
Utah	We require all sandhill cranes be taken with Non-toxic shot regardless of land ownership. Our seasons are only in a few counties however.

Appendix E: Open-Ended Responses

Comments Regarding Non-toxic Shot for Snipe and/or Rail Hunting (Page 7)

Illinois	The regulatory authority can be found in 520 Illinois Compiled Statutes 5/no.18-1 (b) and 17 Illinois Administrative Rule 740.10 (h).
Louisiana	This is restricted to specific portions of one area with waterfowl impoundments that offer good snipe hunting. **Note: Federal Refuges in Louisiana require Non-toxic shot for all species.
Maine	Nontoxic shot is required for rail hunting and coot hunting...statewide
Massachusetts	Non-toxic shot is required for all waterfowl and coot hunting. Waterfowl means migratory game birds of the family Anatidae (ducks, mergansers, geese, and brant).
Nebraska	Also on some federal (USFWS) lands.
New Mexico	NM lumps them with waterfowl.
New York	The text of New York's regulation on non-toxic shot follows. This is a STATEWIDE regulation, for all property--public and private: (c) Non-toxic shot. Ducks, coots, mergansers, geese, snipe, rails and gallinules shall not be taken by any person using or in possession of shot shells loaded with any shot other than steel shot or other shot approved as non-toxic for hunting of waterfowl by the Director of the U.S. Fish and Wildlife Service or a muzzleloading firearm loaded with any shot other than steel shot or other shot approved as non-toxic for hunting of waterfowl by the Director of the U.S. Fish and Wildlife Service.
North Carolina	See previous comment, which would also apply for hunting snipe or rails within posted waterfowl impoundments.
Utah	You cannot possess toxic shot while hunting waterfowl regardless of land ownership. So if you are hunting snipe while hunting waterfowl, you cannot possess toxic shot on public or private land. If you are hunting snipe, and only snipe, you can use toxic shot on all private lands and some public lands.

Comments Regarding Non-toxic Shot for Grouse, Quail, and / or Pheasant Hunting (Page 8)

Illinois	The agency requires nontoxic shot on one public controlled pheasant hunting area. See previous comments on guidelines.
Louisiana	**Note: Federal Refuges in Louisiana require Non-toxic shot for all species.
Maine	Not required for these species
Massachusetts	Non-toxic shot is required for all waterfowl and coot hunting. Waterfowl means migratory game birds of the family Anatidae (ducks, mergansers, geese, and brant).
Minnesota	Many hunters voluntarily use non-toxic shot while pheasant hunting due to the large number of Federal WPA's though out our pheasant range. Reasons given are: 1) not wanting to be in violation of Federal requirements, 2) easier than switching out loads.
Nebraska	Also on some federal (USFWS) lands.
New Mexico	Only Game Dept. lands require Nontoxic shot.
North Carolina	See previous comments for dove hunting. This rule would apply if someone hunted grouse, quail, and/or pheasants within a posted waterfowl impoundment.
North Dakota	Non-toxic shot is required on all USFWS Waterfowl Production Areas
Utah	We don't have grouse on any of our waterfowl management areas, but do have pheasants and quail on some. We require Non-toxic shot for all hunting on state managed waterfowl management areas.

Comments Regarding Discussing Additional Non-Toxic Shot Regulations (Page 9)

Alaska	Recently the Board of Game adopted Nontoxic requirement for all bird hunting in Game Management Unit 26 (entire north Slope and Arctic Coastal Plain). ADF&G has interest in similar regulations in other areas, perhaps first on the Yukon-Kuskokwim Delta (Unit 18). Nontoxic regs in these areas are seen more as a way to further discourage use of lead for waterfowl rather than addressing any significant problem with upland birds.
Florida	Staff are aware of recent research and concerns, but at this point there are no serious discussions about proposing any regulation changes.
Hawaii	we have no waterfowl hunting - two native species, nene goose and koloa duck, are endangered

Illinois	The Division is currently exploring hunter attitudes on nontoxic shot regulations through our hunter surveys. Our hunter surveys are conducted by the Illinois Natural History Survey. A Dove Field Management Work Group (non disbanded) completed a report in May 2005 to provide future management recommendations and guidelines for dove field management on IDNR public land sites. This Work Group addressed the use of nontoxic shot and recommended further education of our hunting public about toxic shot's impact on wildlife.

Appendix E: Open-Ended Responses

Louisiana	It has been discussed at the technical level and elevated conceptually to the administrative level. It is anticipated that the Louisiana Waterfowl Study Commission, a citizenry advisory group with LDWF representation, will have this topic brought to their attention this coming year (for the 2007-08 seasons).
Maryland	We recently implemented a Nontoxic requirement for rails and snipe.
Massachusetts	Agency has followed federal regulatory frameworks
Minnesota	We have formed a Nontoxic Shot Advisory Group of agency experts and hunting and environmental constituent groups that will make recommendations to us regarding implementing broader Non-toxic shot requirements. We expect this group to have completed its task by December of 2006.
Nebraska	We've talked informally about the general issue, but we have not decided to move forward with any particular change at this time.
New Mexico	no additional areas other than where it is already required.
South Dakota	We currently have restrictions on most public land and have no desire to further restrict private lands.
Texas	Only to the extent that we may conduct field lethality studies and other lead availability research, as we are not satisfied that the research that needs to be done has been to date. We will look at the possibility of non-toxic for waterfowl WMAs that hunt doves as well for 2007-08.
Wisconsin	There have been discussions from different parts of the agency as well as different conservation/sportsmans groups about lead use in hunting and fishing. At this point, we are considering working on education of the issue but it is not a top priority. Most staff see banning all use of lead shot sometime in the future but it may be a long way off. The Department has discussed the potential to restrict lead shot for dove hunting because much of the dove hunting occurs in wildlife areas managed for waterfowl. However, we have also done research on the impact of lead on woodcock and consider that lead shot use is likely harmful to a variety of wildlife. Issues of cost and availability of nontoxic shot in different shot sizes (410) have been raised during discussions.

Additional Comments or Suggestions (Page 11)

California	Non-toxic shot is required for a small number of state wildlife management areas.
Delaware	Delaware requires the use of non toxic shot on some of its dove hunting areas on public lands. This is a wildlife area hunting rule only and is not in our regulations.
Florida	This issue has enormous implications for the future of hunting. We must base any decisions in this regard on very strong scientific information. Any movement toward broader nontoxic shot regulations should be weighed very carefully considering the science and the social implications and there must be a very aggressive educational campaign so hunters and other stakeholders have a good understanding of the issues and implications.
Georgia	We are very interested in current research on lead toxicosis in mourning doves, but have no immediate plans to require nontoxic shot for dove hunting.
Illinois	The Division of Wildlife Resources has step back from considering additional nontoxic shot regulations until the biological and sociological information is more refine and complete.
Kentucky	Currently little support by hunters even though nontoxic shot for waterfowl has been required for almost two decades. Cost and myths regarding shot effectiveness still persist whenever this topic is brought up. To gain support would require a large scale effort to educate users to seek acceptance.
Louisiana	One small waterfowl refuge managed by the Louisiana Department of Wildlife and Fisheries is open to dove and rabbit hunting on a restricted basis. Non-toxic shot is required for all hunting.
Michigan	Michigan has managed waterfowl areas that have some areas that are restricted to non-toxic shot for all hunting. Also, additional discussions have been very informal and there are no indication that additional regulations will be proposed.

Missouri	We are currently considering a 2-phase regulation ultimately leading to nontoxic shot requirements for dove hunting by 2008 on all Department conservation areas, and exclusive Nontoxic shot for all hunting on 26 additional riverine wetland areas.
Montana	The state will discuss the issue as it develops a new management plan for upland birds.
Nebraska	With regard to webless migratory game birds, this is an issue that will only increase in importance and public scrutiny. Managers would be wise to move towards a long-term goal of requiring Nontoxic shot for all migratory bird hunting, and likely for all shotgun hunting as well. Once this goal is accepted, managers must work with all stakeholders to come up with the most rational and orderly set of steps necessary to reach the goal within a reasonable time frame.

Appendix E: Open-Ended Responses

North Dakota	The Service needs to take a lead on implementation of non-toxic shot regulations for migratory game bird species other than waterfowl because there are few states that will actually go out on their own to take these actions. It is an extremely complex issue that will not happen overnight. Major steps to be taken are lethality tests of non-toxic shot for mourning doves, and a well planned communications strategy with industry leaders so that the product is made available to hunters. It will be impossible to get hunter buy-in if there are irrefutable claims that they can't even find affordable non-toxic shot for mourning doves.
Pennsylvania	We are waiting for results on nontoxic shot studies on webless migratory game birds. If these studies prove conclusive we likely will begin discussions with our hunters on nontoxic shot regulations for dove, woodcock, snipe and rails. An educational effort with our hunters will be of paramount importance if we require nontoxic shot for other nonwaterfowl species.
Rhode Island	Regulating/restricting the use of non-toxic shot is important regardless of whether or not the species is a waterfowl species, especially for other wetland species (e.g., rails, snipe). An argument in opposition of restricting use in Rhode Island for other wetland species (e.g., rail, snipe) is that there are few hunters of these species due to low numbers of these species.
Texas	Additional “real world” research on lead availability must be accomplished as well as lethality research to demonstrate which nontoxic loads work best among those existing loads currently available, as well as demonstrate that steel works well for doves. We do not feel that hunters will embrace steel for doves until they see better research results than recently presented using forced feeding and feeding trays rather than natural feeding options, as well as looking only at heavily hunted public fields that make up probably less than 0.02% of all dove hunting areas in the state.
Wisconsin	At this point, WI will likely move in the direction that other states have which is to slowly begin restricting the use of lead shot. It would probably begin with some state wildlife areas for dove hunting and expand over time from there.
Wyoming	Wyoming has a statute that prevents instating nontoxic shot regulations unless the amount of lead in soil exceeds a certain amount. Only two state-run wildlife management areas, which are primarily waterfowl habitat, currently have crossed this threshold. The statute would have to be changed in order to allow for further consideration of other nontoxic shot regulations.

Appendix II. Nontoxic and Lead Shot Literature Review

NONTOXIC AND LEAD SHOT LITERATURE REVIEW *(October 31, 2006)*

THE FOLLOWING IS: 1) A LIST OF MANUSCRIPTS RELATING TO NONTOXIC SHOT, LEAD SHOT, AND THE IMPACTS OF LEAD ON WILDLIFE AND THE ENVIRONMENT, AND 2) SUMMARIES OF SELECTED MANUSCRIPTS. THIS LITERATURE REVIEW WAS COMPILED BY STUDENT INTERN, ROXANNE FRANKE (MINNESOTA STATE UNIVERSITY – MANKATO), FOR THE *NONTOXIC SHOT ADVISORY COMMITTEE REPORT* COMPILED BY THE SECTION OF WILDLIFE, MINNESOTA DEPARTMENT OF NATURAL RESOURCES. FOR INFORMATION ON THIS LITERATURE REVIEW, CONTACT RICHARD KIMMEL, WILDLIFE RESEARCH GROUP LEADER, MINNESOTA DEPARTMENT OF NATURAL RESOURCES, EMAIL RICHARD.KIMMEL@DNR.STATE.MN.US, PHONE 507-642-8478 EXT. 225).

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SUMMARIES OF SELECTED MANUSCRIPTS:

EVIDENCE OF LEAD SHOT TOXICITY

Anderson, W. L., and S. P. Havera. 1985. Blood lead, protoporphyrin, and ingested shot for detecting lead poisoning in waterfowl. Wildlife Society Bulletin 13(1):26- 31.

- Gizzards were collected from 3,389 mallards at 26 locations in Illinois during the 1979 hunting season and inspected for lead.
- Blood also taken from 2,265 waterfowl at 7 locations and analyzed for concentrations of lead and PP (a blood pigment precursor to hemoglobin)

- The percentage of 3,389 mallards with ingested shotgun pellets was 6.3% (determined by manual examination of grit), 7.9% (X-rayed), and 8.2% (found via flouoroscopy). Differences between the techniques were significant ($P < 0.05$).
- Blood samples from mallards from 4 areas indicated that an average of 8.1% of the mallards had concentrations of lead that equaled or exceeded the threshold of lead poisoning (0.5 ppm) and average of 3.9% had concentrations of PP that equaled or exceeded the threshold (40 ug/dl).

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Finley, M. T., and M. P. Dieter. 1978. Toxicity of experimental lead-iron shot versus commercial lead shot in mallards. Journal of Wildlife Management 42(1):32-39.

- Lab experiment with mallards, comparing lead-iron shot (38.1 % lead) or commercial lead shot
- Mortality was higher in groups given with commercial lead shot than in groups given lead-iron shot
- One #8 shot caused 35% mortality with higher amounts of lead causing 80-100% mortality. 5% mortality was caused by ingestion of two #4 lead-iron shot.

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Franson, J. C. and Caster, T. W. 1982. Toxicity of dietary lead in young cockerels. Veterinary and Human Toxicity 24(3):421-423.

- Day-old white leghorn cockerels were fed lead-contaminated feed (either 1.1 or 1.4 ppm lead)
- Four birds from each group were sacrificed on days 3, 7, 14, and 28 and lead analyses were conducted.
- Mean body weights of birds receiving the lead diet were significantly less than controls. By day 28, lead-exposed birds weighed 47% of control birds' weights.
- Liver lead residues in cockerels fed lead were from 9-55 x control residues, kidney residues were as much as 93 x greater than controls.
- Blood lead residues were much higher than residues considered diagnostic for lead poisoning in most domestic mammals.
- Lead exposure had a marked effect on growth
- Franson states "birds in general are quite resistant to lead toxicosis".

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Hunt, W. G., W. Burnham, C. N. Parish, K. K. Burnham, B. Mutch, and J. L. Oaks. 2006. Bullet fragments in deer remains: implications for lead exposure in avian scavengers. Wildlife Society Bulletin 34(1):167-170.

- Conducted whole or partial remains of 38 deer killed with standard center-fire, breach-loading rifles
- All whole or eviscerated deer killed with lead-based bullets contained bullet fragments.
- The proportion (90%) of offal piles containing fragments is not surprising, given that gut piles contain the thoracic organs normally targeted by hunters.

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Locke, L. N., and G. E. Bagley. 1967. Case report: coccidiosis and lead poisoning in Canada geese. Chesapeake Science 8(1):68-69.

- At Prime Hook National Wildlife Refuge, Delaware, 15-20 Canada geese were found dead, 4 of the dead geese had diagnostic studies conducted
- One goose which had 4 shot in pellets its gizzard
- Levels of lead in the livers are all within ranges suggestive to lead poisoning

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Scheuhammer, A. M., J. A. Perrault, E. Routhier, B. M. Braune, and G. D. Campbell. 1998. Elevated lead concentrations in edible portions of game birds harvested with lead shot. Environmental Pollution 102:251-257.

- Conducted field experiment in Canada, evaluating lead concentrations in pectoral muscles of hunter shot game birds

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Sileo, L., R. N. Jones, and R. C. Hatch. 1973. The effect of ingested lead shot on the electrocardiogram of Canada geese. Avian Diseases 17(2):308-313.

- Lab experiment - 5 geese dosed with 15 No. 6 lead shot, also fed corn along with commercial food (to enhance toxicity of the lead)
- Electrocardiograms and body weights were recorded daily until poisoned geese died, then necropsies were done
- All dosed geese lost 25 to 45% of their initial body weight and died 11-45 days after ingesting lead

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Stendell, R. C., R. I. Smith, K. P. Burnham, and R. E. Christensen. 1979. Exposure of waterfowl to lead: a nationwide survey of residues in wing bones of seven species, 1972-73. US Government Printing Office 1802-M/7.

- Wing bones were collected from seven species of waterfowl from flyways and analyzed for lead
- 4,190 duck wing bones were collected reflecting lead residues ranging from trace amounts (<0.5 ppm) to 361 ppm
- Species of redheads, black ducks, mallards, canvasbacks, and pintails all had intermediate levels of lead. Wing bones of mottled ducks contained the highest levels and lesser scaup had the lowest level of lead
- Compared geographic patterns of lead exposure in the species along flyways. For example immature mallard lead levels were higher from the Atlantic flyway than the Pacific and Mississippi flyway

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Tavecchia, G., R. Pradel, J. Lebreton, A.R. Johnson, and J. Mondain-Monval. 2001. The effect of lead exposure on survival of adult mallards in the Camargue, southern France. Journal of Applied Ecology 38(6):1197-1207.

- Captured 2710 adult mallards from a wintering area for several species of water birds
- Investigated influence of lead pellet exposure (presence of ingested pellets and the presence of pellets in the muscles) on survival
- Maximum count of pellets in the gizzard was 50, estimated proportion of gizzard-contaminated birds was 11%
- Distribution in 4 groups: 68% no exposure to, 8% gizzard-contaminated only, 20% muscle-contaminated only, and 3.4% both gizzard and muscle contaminated.
- Survival of lead-affected mallards was 19% lower than unaffected birds for both types of lead exposure. The two sources of mortality were additive

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Trainer, D. O., and R. A. Hunt. 1965. Lead poisoning of whistling swans in Wisconsin. Avian Diseases 9(2):252-264.

- Mortality of swans due to lead poisoning has been recognized in Wisconsin since 1944
- Wild Swans were collected for necropsy and analysis for lead
- Results (45 birds) established lead poisoning was responsible for the majority of the mortalities.
- Number of pellets recovered from the effected birds ranged from 0 to 201 and averaged 50 pellets per bird.

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Wilson, I. D. 1937. An early report of lead poisoning in waterfowl. Science, New Series 86(2236):423.

- Lead poisoning in ducks, geese and swans discovered in Back Bay, Virginia, and Currituck Sound, North Carolina.
- Analyzed gizzards, contained over 100 full sized No. 4 lead shot and partly ground remains

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HISTORY OF LEAD SHOT PROBLEMS

Bellrose, F.C. 1959. Lead poisoning as a mortality factor in waterfowl populations. Illinois Natural History Survey Bulletin 27(1):235-288.

- Reviewed some history of lead poisoning in waterfowl citing literature from the 1930's - 1950's.
- Joint research project between Ill. Nat. History Survey and Western Cartridge Co. (now Winchester) with objectives: 1) evaluating waterfowl losses due to lead, 2) look at alternatives to lead shot, 3) determine physiological effects of lead poisoning on waterfowl. (Only the first objective reported in this paper)
- Early waterfowl dies offs were recorded as early as 1874 - (an 1894 article) reporting waterfowl dies offs near Galveston, TX, assumed from lead
- Hundreds of ducks died from lead poisoning in Indiana in 1922
- Feb. 1930 - coastal Louisiana die-off from lead poisoning. In a 200 acre rice field they found 199 dead ducks, mostly pintails and mallards
- 'Recent' die offs (1930's-1950's) reported in a table listing location, time of occurrence, species, bird numbers, and reference. Number of birds in die-offs is as high as 16,000 is 2 cases (Missouri 1945-1957; Arkansas 1953-1954)

- Outbreaks dependent on size of late fall/early winter population in an area, species of ducks with similar feeding habits, type and amount of food available, amount of lead shot present, bottom conditions, water level, and ice cover
- Die-offs are seasonal. Most die-offs during late fall and early winter - **after** high hunting pressure. Hunting activity keeps ducks from feeding in hunting areas reducing die-offs during hunting season. Spring die-offs rare in ducks, more common in swans and geese.
- Review of some of the Illinois research

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Osmer, T. L. G. 1940. Lead shot: its danger to water-fowl. The Scientific Monthly 50(5):455-459.

- During waterfowl hunting season the chances of lead poisoning increase
- Lead shot remains available to waterfowl after the hunting season
- Osmer stated "It has been experimentally determined that the ingestion of 6 No. 5 shot by a duck is fatal. Even 2 or 3 shot are often fatal." (Osmer did not provide a citation or evidence for the statement.)
- Many lakes across the nation were hunted heavily before becoming refuges which left these sites with accumulated old lead shot and a continuing potential for lead poisoning.
- Grit is essential for a ducks digestive system and apparently they cannot differentiate between lead shot, granite, or quartz of the same size.
- To determine the availability of lead shot to gravel sampling was done with a Peterson dredge in the areas where waterfowl feed.

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LEAD IN THE ENVIRONMENT

Beyer, W. N., and J. Moore. 1980. Lead residues in eastern caterpillars (*Malacosoma americanum*) and their host plant (*Prunus serotina*) close to a major highway. Environmental Entomolgy 9(1):10-12.

- Conducted field work from parkways on tent caterpillars and host plant to analyze for lead
- Caterpillars averaged 76 % of the lead concentration found in host plant leaves

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Clark, D. R., Jr. 1979. Lead concentrations: bats vs. terrestrial small mammals collected near a major highway. Environmental Science and Technology 13(3):338-341.

- Field experiment preformed on small mammals (meadow voles, white-footed mice, and short-tailed shrews) and bats to determine lead concentrations
- Terrestrial mammals generally had lower lead concentrations than bats
- Estimated dosages of lead concentrations exceeded dosages that caused mortality or reproductive impairment in domestic animals

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Getz, L. L., L. B. Best, and M. Prather. 1977. Lead in urban and rural song birds. Environmental Pollution 12:235-238.

- Obtained lead concentrations of song birds living in rural and urban environments in Champaign- Urbana
- Lead concentrations were found higher in urban populations
- With increased use of unleaded gasoline, lead contamination of urban regions should be decreasing which will also decrease the lead concentrations in urban habitats

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Locke, L. N., S. M. Kerr, and D. Zoromski. 1982. Lead poisoning in common loons (*Gavia immer*). Avain Diseases 26(2):392-396.

- Common loons necropsyed
- 3 loons were found to be lead poisoned
- Lead fragments of fishing tackle were found in 2 loons with high lead liver levels

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NONTOXIC SHOT REGULATIONS

Thomas. V. G., and M. P. Twiss. 1995. Preventing lead contamination of lakes through international trade regulations. Lake and Reservoir Management 11(2):196.

- Lead contamination in Canada's lakes have been a potential problem for toxicosis in waterfowl and fish-eating birds
- Under the Canadian Environmental Protection Act, Canada has the potential to regulate production and commerce in lead shot and sinkers
- The North American Free Trade Agreement and its environmental adjunct, The North American Agreement, on Environmental Cooperation could regulate trade in lead substitutes among parties
- Actions taken by Canada, the USA, and Mexico would promote the security of water-birds habitats on a continental scale.

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Thomas, V. G., and Owen, M. 1996. Preventing lead toxicosis of European waterfowl by regulatory and non-regulatory means. Environmental Conservation 23(4):358-364.

- Proposals to eliminate the use of lead shot in wetlands has been made under Bonn and Bern Conservations
- Proposal was also made by European Union –USA to reduce the use of different categories of lead under an Organization of Economic Cooperation and Development Council Act, but did not included lead shot
- The passing of European Council regulation has seen the most effective remediate for the trans-boundary toxic problem
- Responsibility to enact and enforce a European Council regulation is the prerogative of each member state, a single regulation would promote consistency of action amongst all states.

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ALTERNATIVE SHOT

Haseltine, S. D., and L. Sileo. 1983. Response of American black ducks to dietary uranium: a proposed substitute for lead shot. Journal of Wildlife Management 47(4):1124-1129.

- Steel is presently the only approved substitute for lead shot (1983 publication), but uranium, studied here, has been proposed as another substitute
- Uranium has low radioactivity, which is the main concern regarding potential effects on wildlife
- Study examined the chemical toxicity of metallic uranium to waterfowl
- 40 American black ducks were given dosages of 0, 25, 100, 400 or 1,600 ppm powdered uranium in their mash.
- No pattern in weight gain or loss that reflected treatment level was found
- No sub-lethal organ damage as a result of uranium dosage

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Appendix III. Nontoxic Shot Alternatives

U.S. Fish & Wildlife Service

Division of Migratory Bird Management

NONTOXIC SHOT REGULATIONS FOR HUNTING WATERFOWL AND COOTS IN THE U.S

January 2006

BACKGROUND

The ban on the use of lead shot for hunting waterfowl was phased-in starting with the 1987-88 hunting season. The ban became nationwide in 1991. Nontoxic shot regulations apply only to waterfowl, defined as the family Anatidae (ducks, geese, [including brant], and swans) and coots. Nontoxic shot is defined as any shot type that does not cause sickness and death when ingested by migratory birds.

APPROVED SHOT TYPES

The shot types that are approved as nontoxic for waterfowl hunting in the U.S. are the following.

Approved shot type*	Composition by weight
bismuth-tin	97% bismuth and 3% tin
iron (steel)	iron and carbon
iron-tungsten	any proportion of tungsten and ≥1% iron
iron-tungsten-nickel	≥1% iron, any proportion of tungsten, up to 40% nickel
tungsten-bronze	51.1% tungsten, 44.4% copper, 3.9% tin, and 0.6% iron and 60% tungsten, 35.1% copper, 3.9% tin, and 1% iron
tungsten-iron-copper-nickel	40-76% tungsten, 10-37% iron, 9-16% copper, and 5-7% nickel
tungsten-matrix	95.9% tungsten and 4.1% polymer
tungsten-polymer	95.5% tungsten and 4.5% Nylon 6 or 11
tungsten-tin-iron	any proportions of tungsten and tin and ≥1% iron

tungsten-tin-bismuth	any proportions of tungsten, tin, and bismuth
tungsten-tin-iron-nickel	65% tungsten, 21.8% tin, 10.4% iron, and 2.8% nickel

* Coatings of copper, nickel, tin, zinc, zinc chloride, and zinc chrome on approved nontoxic shot types also are approved.