

STEEL SHOT: A NATIONAL PERSPECTIVE

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ABSTRACT.

There are currently 31 states containing steel shot zones of some kind. The national trend, except in the Pacific Flyway, has been to expand the number and geographical area of non-toxic shot zones, and to increase the use of non-toxic shot within such zones. Since 1976 steel shot regulations have been involved in five separate court litigations. In all five cases the courts have upheld the steel shot regulations in question. Commercial steel shot-shell offerings have expanded greatly since 1981, but no pellet size smaller than No. 4 is, as yet, being loaded. Steel loads are now available in 10, 12, and 20 gauge shells. The Cooperative Lead Poisoning Control Information Program has been formed in response to the current U.S. Fish and Wildlife Service position of decreased involvement in non-toxic shot matters. Currently 26 states and two private corporations belong as contributing cooperators.

INTRODUCTION AND BACKGROUND

Since the publication of the final environmental impact statement (FEIS) on steel shot (U.S. Fish and Wildlife Service 1976), a network of federal and state non-toxic shot zones for the hunting of waterfowl has been established in the 48 contiguous states. While the majority of the zones initially were established and enforced by the federal government, this no longer is the trend. Since the enactment of the Stevens Amendment in 1979, appropriated funds for the Department of the Interior for fiscal years 1979, 1980, 1981 and 1982 have been restricted in their use to implementation and enforcement of non-toxic shot regulations for the hunting of waterfowl only in those states and areas approved by the appropriate state regulatory authority. In states denying approval, the non-toxic shot regulations have not been enforced since 1979.

In addition to the establishment of non-toxic shot zones, the U.S. Fish and Wildlife Service (FWS) has since the inception of the zones, conducted research in the pathology and extent of lead poisoning (plumbism) and in the effectiveness of non-toxic shot (steel shot) loads. At the annual North American Wildlife and Natural Resources Conference in March 1982, the Director of the FWS presented the following statement regarding the FWS's continued involvement in the steel shot program:

"The steel shot program initiated by the Fish and Wildlife Service in 1976 has been a matter of much concern to the Service, the States and the Flyway Councils during the past 3-4 years. Opposition from hunters about regulations requiring steel shot by waterfowl hunters and disagreement over the adequacy of guidelines for the program resulted in uncertainty and confusion over how best to proceed. There was general agreement on the need for a review of the entire program.

In response to this the Service undertook a review of its activities in this area. In addition, an interagency committee was formed to review the matter from the perspective of the State wildlife agencies. It was sponsored by the International Association of Fish and Wildlife Agencies and it met on August 14, 1981, to discuss steel shot and the controversy surrounding it. The committee was composed of representatives from the Flyway Councils, the Service, ammunition manufacturers, and private conservation organizations.

The Committee submitted a report to the International Association containing its views and recommendations. The report was accepted and forwarded to the Service for review and consideration. The Service has completed its review. The recommendations in the report, with some modification on certain points to reflect Service views and capabilities have contributed usefully to a redefinition of the Service approach to the lead poisoning/steel shot issue. The main points of this approach are as follows.

1. The Service will continue to take the position that lead poisoning in waterfowl should be alleviated wherever it is determined to be a significant problem.
2. The principal role of the Service will be to conduct research necessary to gain a better understanding of the lead poisoning problem, and provide recommendations and guidelines on how best to deal with it.
3. In regard to steel shot regulations, maximum opportunity will be provided for States to determine the most appropriate application of steel shot rules within their boundaries. The Service will advise and assist to the extent possible.
4. It is highly desirable that guidelines for the use of steel shot by States or groups of States be established at the Flyway Council level. There needs to be some degree of consistency and coordination among States or groups of States in the application of steel shot rules because independent actions by individual States may adversely affect neighboring States.
5. In regard to research on the effectiveness of steel shot the Service is of the view that this has been adequately explored. No further effort will be given to this research topic by the Service.
6. When changes in steel shot regulations are found to be necessary or desirable it is important that hunters, ammunition dealers and suppliers, and other interested parties be notified in advance so that they can prepare for the change. A minimum of 12-14 months advance notice is desirable regardless of the direction of change.
7. To the extent possible the Service will serve as a central clearing house for research and management information on lead poisoning and other waterfowl diseases.

We believe the approach outlined here is more realistic and practical than the one taken previously by the Service. We hope it will be more acceptable and useful to the States - that it will reduce the level of controversy and conflict and allow us to get on with the job of managing the resource."

In subsequent meetings with the FWS by members of the Interagency Committee on Non-Toxic Shot Regulations of the International Association of Fish and Wildlife Agencies, representatives of the FWS maintained that the FWS's official position on steel shot as represented in the March 24, 1982, statement, is accurate and that the position has not substantially changed (International Association of Fish and Game Agencies, Interagency Committee on Non-Toxic Shot Regulations 1982).

A total of 33 states required the use of non-toxic shotshell loads for waterfowl hunting during the 1982-83 waterfowl season on federal zones, national wildlife refuges, or state established non-toxic shot zones. Input to date as reported in the Federal Register indicates this number will be 31 for the 1983-84 season. By flyway they include:

Atlantic	10 states Connecticut, Delaware, Florida, Georgia, Massachusetts, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island
Mississippi	11 states Alabama, Illinois, Indiana, Iowa, Louisiana, Ohio, Michigan, Minnesota, Mississippi, Missouri, and Wisconsin
Central	7 states Colorado, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, and Texas
Pacific	3 states Oregon, Washington, and Utah

For 1983 four states responded to the FWS's annual request for comments on proposed hunting regulations pertaining to non-toxic shot zones. These included Florida, Michigan, Illinois, and Texas. Florida, Illinois, and Texas proposed expansion of zones and/or additional areas be included in the federal regulations for their respective states, while Michigan requested a redefinition of boundaries which would decrease the land area included in current non-toxic shot zones within its boundaries.

"Michigan - In 1982 a decision was made by the Michigan Department of Natural Resources to redefine the boundaries of the non-toxic shot zones in the State. This was done to identify more accurately the situations in which lead poisoning of waterfowl is most serious. The State waterfowl hunting regulations reflected this change in 1982, but no amendment was proposed for the Federal regulation (46 FR 40882-83). The state of Michigan requested that the State regulation, rather than the Federal regulation, be enforced in 1982 and this was done. The proposal amends the rule to be identical in wording to Michigan State regulations as implemented in 1982. This proposed regulation describes zones in which approximately half of the Michigan waterfowl harvest occurs and represents a 23 percent reduction in the area previously covered."

"Illinois - Periodic Report No. 36 of the Illinois Department of Conservation is entitled, Potential for lead poisoning die-offs among waterfowl at Rend Lake. This document points out that 450 to 600 geese and ducks died of lead poisoning at Rend Lake in March 1982. Gizzards of mallards harvested at Rend Lake were examined in 1982 and 11.4 percent contained ingested shot. Based on these findings the Illinois Department of Conservation has requested that Rend Lake be proposed as a non-toxic shot zone."

"Florida - The Florida Game and Fresh Water Fish Commission has concluded, based upon studies conducted by the Commission, that three new zones be proposed for Florida. All three areas are small, but hunter activity and duck use are concentrated. Five hundred to 1,000 waterfowl hunters use the areas."

"Texas - The Texas Parks and Wildlife Department has recommended seven southeast Texas counties and portions of five mid-coast counties for addition to the non-toxic shot zones in the State. Studies conducted by the Department in 1981-82 indicate that seven major species of duck had an incidence of ingested shot of 15 percent. The incidence of ingested shot in all species was 10 percent. The incidence in geese was 3 percent. The area proposed for Texas contains 47 percent of the waterfowl hunting activity of the state," U.S. Fish and Wildlife Service 1981, 1983).

A substantial number of states with non-toxic shot zones have interpreted the FWS's statement to mean generally that the principal role of the FWS with regard to non-toxic shot should henceforth be:

- A.) To continue to conduct research necessary to gain a better understanding of the lead poisoning problem and serve as a clearinghouse for lead poisoning information.
- B.) To give no further effort to research regarding the effectiveness of steel shot.
- C.) Regarding steel shot regulations, to advise and assist states only; the actual promulgation of further non-toxic shot zones and regulations will be left up to the states.

STEEL SHOT ZONES

There are currently 23 states with federal steel shot zones supported by state regulations, an additional six states with steel shot required on national wildlife refuges only, and two additional states with state established steel shot zones and regulations. Those states with federal steel shot zones supported by state regulations currently in effect for the 1982-83 waterfowl hunting season include:

Atlantic Flyway	9 states Connecticut, Delaware, Florida, Massachusetts, New Jersey, New York, North Carolina, Pennsylvania and Rhode Island
Mississippi Flyway	8 states Illinois, Indiana, Iowa, Ohio, Michigan, Minnesota, Missouri, and Wisconsin
Central Flyway	4 states Kansas, Nebraska, New Mexico, and Texas
Pacific Flyway	2 states Oregon and Washington

Those states with national wildlife refuges only requiring the use of steel shot for the 1982-83 waterfowl season include:

Atlantic Flyway	1 state Georgia
Mississippi Flyway	3 states Alabama, Louisiana, and Mississippi
Central Flyway	1 state Oklahoma
Pacific Flyway	1 state Utah

Those states with state steel shot zones and regulations only requiring the use of steel shot for the 1982-83 waterfowl season include:

Atlantic Flyway	None
Mississippi Flyway	None
Central Flyway	2 states Colorado and South Dakota
Pacific Flyway	None

LITIGATION

Non-toxic shot regulations have been challenged in court on five separate occasions since 1976. Two cases were heard in federal court, the other three in the state courts of South Dakota, Texas, and Florida. The court cases involved:

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| 1976 | The National Rifle Association of America (NRA) vs. U.S. Dept. of the Interior, et al. |
| 1980 | The South Dakota Migratory Bird Association vs. the South Dakota Game, Fish, and Parks Commission |
| 1981 | The Muldoon Hunting and Fishing Club, Inc., vs. Texas Parks and Wildlife Department and Charles D. Travis, Executive Director |
| 1982 | Bill Alexander, et al. (duck hunters) vs. Colonel Robert M. Brantley, Director, and the Florida Game and Fresh Water Fish Commission |
| 1982 | Frederick Fuerber, et al. (waterfowl hunters) vs. U.S. Dept. of the Interior, et al.; Robert F. Flacke, Commissioner; and the New York State Department of Environmental Conservation |

In all five cases the court decisions upheld the steel shot regulations in question. The cases and court decisions can be summarized as follows.

In the 1976 NRA vs. U.S. Department of the Interior case, NRA charged that the FWS's final environmental impact statement (FEIS) on steel shot was inadequate and that its administrative decision to convert to non-toxic shot in problem areas (steel shot zones) was arbitrary and capricious. During the three day trial expert testimony was heard on lead toxicity, steel and lead shot ballistics, waterfowl habitat, gun damage tests, steel vs. lead tests, the safety and performance of steel shot, and the preparation of the FEIS and non-toxic shot regulations. The U.S. District Court of the District of Columbia found the FEIS adequate and the FWS decision rationally based.

NRA appealed the decision to the District of Columbia Court of Appeals. The plaintiff's brief on appeal contested the lower court's findings-of-fact and asked for a separate EIS for the use of non-toxic shot in the Atlantic Flyway. In 1978 the Court of Appeals rejected both arguments of appeal and upheld the lower court's decision. The FWS's non-toxic shot regulations have not been seriously challenged since (Feierabend, unpublished).

In the 1980 South Dakota Migratory Bird Association vs. the South Dakota Game, Fish, and Parks Commission case the plaintiffs, a coalition of commercial goose camp operators and waterfowl hunters, challenged the authority of the Commission to define boundaries for a steel shot zone along the Missouri River and to require the use of a specific metal type (steel shot) for the hunting of waterfowl. The plaintiffs filed application in the Circuit Court of Hughes County in September of 1980 to enjoin the state from enforcing its steel shot regulations. The plaintiffs maintained in addition that the boundaries of the steel shot zone had been drawn in an arbitrary and capricious manner, that steel shot would pose a hardship to users due to increased cost over lead shotshells and damage to shotguns associated with the use of steel, and that steel shot would increase crippling losses of waterfowl thus negating whatever birds would be saved from lead poisoning. The trial lasted one day in which testimony was heard on evidence of lead poisoning within the zone, crippling losses, gun barrel damage, steel shot costs, expert testimony on the results of steel vs. lead field tests on geese and lead poisoning. In a memorandum opinion the Court decided in favor of the State ruling that the regulations had been legally adopted, were within the Commission's jurisdiction did not violate constitutional principles, and were not arbitrary and capricious (South Dakota Circuit Court 1981).

The plaintiffs later appealed the lower court's decision to the Supreme Court of South Dakota. In their appeal, the plaintiffs maintained that the steel shot regulations were invalid because the Commission lacked the constitutional authority to issue such regulations. The State Supreme Court upheld the Circuit Court's decision. The Court concluded that the Commission does possess the constitutional authority to adopt and implement steel shot zones and to determine the metal type to be used for harvest of waterfowl within such zones (South Dakota Supreme Court 1981). No further challenge of the steel shot zones or rule has occurred in South Dakota since.

In the 1981 Muldoon Hunting and Fishing Club vs. Texas Parks and Wildlife Department et al. case, in the fall of 1981 just weeks before the state's waterfowl season was to open the plaintiffs filed in the District Court of Travis County a temporary restraining order (TRO), declaratory judgment, and permanent injunction against the state of Texas. Beginning the 1981 waterfowl season Texas had expanded an existing steel shot zone to include land owned by the club. The plaintiffs argued that the steel shot zone would impose unacceptable hardships on its members by interfering with and impairing their legal rights and privileges to hunt. To support this claim, the club argued that steel shot performs inadequately when compared to lead, increases crippling losses of waterfowl, causes damage to firearms and teeth, was unavailable locally, was more expensive than lead, could not be reloaded, and discriminated against women and children who allegedly could not shoot shotgun gauges larger than the 20 gauge. The plaintiffs also argued that the zone was arbitrarily selected and that the Commission could not substantiate that lead shot constitutes a threat to migratory waterfowl or that the rule would reduce losses to lead poisoning.

The State agreed to a temporary injunction in behalf of the plaintiffs in exchange for an expeditious full trial on the merits. The trial on the merits lasted five days. The defendants provided expert testimony on steel shot performance, barrel damage, ability of women and children to shoot shotgun gauges larger than the 20 gauge, the results of various steel vs. lead field tests, the pathology of lead poisoning, population status of Central Flyway waterfowl, and the methodology and adequacy of the State's gizzard analyses to determine lead ingestion rates and subsequently non-toxic shot zones boundaries. Ballistics experts, representatives from the munitions industry, state and federal biologists, wildlife pathologists, concerned sportsmen, legal analysts, and state officials presented testimony (Feierabend, unpublished).

The court ruled in behalf of the State and rendered judgment that the steel shot zone as expanded and established was valid and lawful. It further declared that the State's non-toxic shot regulations were a rational means of reducing the incidence of lead poisoning in waterfowl, were constitutional, were not discriminatory, vague, or ambiguous, that the State possessed the authority to issue them because they were supported by substantial evidence, and were properly preceded by agency investigations (Texas Circuit Court 1981).

The plaintiffs then appealed the lower court's judgment to the Texas Court of Appeals. However, after filing a notice of appeal, the club abandoned it. The appeal was dismissed for want of prosecution. No further challenge has been leveled against the State of Texas regarding non-toxic shot regulations (Cross 1982).

In the 1982 Bill Alexander et al vs. the Florida Game and Fresh Water Fish Commission case, a coalition of non-affiliated duck hunters challenged the state's steel shot regulations which required the use of steel shot in 12 ga. guns for waterfowl hunting on certain lakes. The plaintiffs claimed that steel shot is more dangerous to humans than lead shot because it ricochets off water, creates a dental hazard, and has a poorer "spread" pattern than lead. The plaintiffs also challenged the rule on its constitutionality under Florida state law.

The case proceeded similarly to the Texas case in that the Circuit Court of Leon County, Florida, issued a TRO against the Florida Game and Fresh Water Fish Commission, until a full trial on the merits could be held.

The case was heard in the spring of 1982, after the close of the 1981-82 waterfowl season. The trial lasted two days. One of the principal witnesses for the plaintiffs was a representative of Olin Corporation who the plaintiffs did not present as an expert, but who argued that the results of the 1972-73 Winchester laboratory test at Nilo proved steel shot was inferior to lead and would cause increased crippling losses of waterfowl. Another of the principal witnesses for the plaintiffs was a Mr. Frank G. Harris, III, a duck hunter from the state of Louisiana who, based on a news release and a letter from a Dr. Don W. Hayne to the Louisiana Department of Wildlife and Fisheries, alleged that the results of the recently completed Lacassine steel vs. lead field test (1980-81, unpublished) provided scientific evidence that steel shot would increase crippling losses of waterfowl. In his testimony Mr. Harris used most of the same arguments and reasoning as presented in his recent article in Ducks Unlimited magazine entitled, "The Lacassine Story" (Harris 1982).

The defendants presented expert testimony from a ballistics expert, biologists, disease authorities, a biometrician, together with testimony from a munitions company representative. These witnesses testified concerning the pathology of lead poisoning, the population dynamics of waterfowl in the Atlantic Flyway, and the evidence of lead ingestion and its link to and the extent of lead poisoning in waterfowl wintering in Florida. Other testimony was given concerning barrel damage, steel vs. lead shot patterns, the cost of steel loads, and the availability of steel in gauges other than 12. Testimony from the ballistics expert presented arguments that the Nilo test as a laboratory test is not an accurate predictor of continental crippling losses to waterfowl from either lead or steel, and that Mr. Harris had misinterpreted the results of the Lacassine test. Additional testimony from both the ballistics expert and the biometrician established that the Lacassine test agrees rather than disagrees with the results of previous field tests regarding crippling losses to waterfowl populations of lead vs. steel, i.e., that there is nothing in the body of field test data thus far that substantiates the allegation that the use of steel shot will cause significantly greater wounding losses to continental duck and goose populations than lead shot.

Both plaintiffs and defendants presented sportsmen who testified either to their satisfaction or dissatisfaction with the performance they had experienced from steel shot for taking waterfowl.

The court in its decision and order reversed its earlier decision, and found in favor of the State. The court ruled that the plaintiffs had not established that the regulation was arbitrary or without reasonable basis. The court further found that the zone in question was reasonably established after the state had found Leon County possessed the highest rate of lead shot ingestion in ducks of any area in Florida, that the problem of lead poisoning is a real problem that is difficult to detect, and that lead poisoning is a significant problem among waterfowl in the United States. The court further found that the possibility of gun damage from steel was limited to a minority of shotgun types, that the availability of steel shot is dependent upon demand, and that the additional cost of steel relative to lead was not greater than 25% and represented a fairly insignificant factor in the overall cost of waterfowl hunting.

The court also found that while there was some conflicting evidence as to the effectiveness of steel shells, nothing was established to show that steel shot cripples more ducks than lead shot. The court found that while the rule as promulgated by the state may pose an inconvenience or hardship to some individuals, equal protection of the law had not been denied, since the steel shot rule applied equally to all persons similarly situated (Florida Circuit Court 1982). Florida has not been challenged on its steel shot rule since.

The most recent court action on steel shot, Frederick Faerber et al. vs. the U.S. Department of the Interior et al. and the New York State Dept. of Environmental Conservation was held in the U.S. District Court in New York in the summer of 1982. In 1982 after much public debate, the New York Department of Conservation issued final non-toxic shot regulations for hunting waterfowl in the Hudson River Valley. Shortly thereafter, a group of local waterfowl hunters brought suit in the U.S. District Court of New York challenging both federal and state steel shot regulations, alleging that New York had acted arbitrarily and capriciously in establishing the Hudson River Valley non-toxic shot zone. In addition, the

plaintiffs alleged the state failed to consider the effect of diet on waterfowl (plumbism), failed to evaluate the cost of hunters of using steel shot, failed to provide hunters with information on steel shot damage to firearms, and employed flawed statistical and analytical techniques (Feierabend, unpublished).

Within days after the suit was filed, the state and federal defendants called for a joint motion for summary judgment. The plaintiffs failed to appear in court the day of the hearing. In a memorandum decision and order the court granted the summary judgment. The court found the zone in question had been established after four years of empirical research and was not established capriciously or arbitrarily. The court found that the federal and state defendants had presented voluminous studies and affidavits authored by experts that controverted all of the plaintiffs allegations, while the plaintiffs chose to rest on bare assertions enumerated in their complaint (U.S. District Court 1982). There have been no further challenges of the New York steel shot zone or regulations.

CURRENT AND NEW STEEL SHOT LOADS

Since 1980, four new steel shot loads have been introduced by the munitions industry (Table 1). In 1980 Federal Cartridge Corporation introduced the first steel shot load in other than 12 gauge, a 3½" magnum 10 gauge load containing 1-5/8 ounces of steel BB's (0.18") or 2's (.015") with a nominal velocity of 1345 fps. In 1981, Federal Cartridge Corporation introduced the first 20 gauge steel load, a 3" magnum load containing one ounce of steel shot in size No. 4 (.013") only, possessing a nominal velocity of 1335 fps. In 1982, Federal introduced the first 2-3/4" 20 gauge steel load, a 3/4 ounce load available in shot size No. 4 only, and developing a nominal velocity of 1425 fps. In this same year Winchester Group, Olin Corporation marketed a 3½" magnum 10 gauge load containing 1-3/4 ounces of steel shot in shot sizes BB and 2, and developing a nominal velocity of 1260 fps.

Table 1. Characteristics of factory steel loads currently available.

Steel Load	Factory Designation	Velocity (Feet Per Second)	Shot Sizes
3-1/2", 10 ga., 1-3/4 oz. (Win.)	MAX	1260	BB, 2
3-1/2", 10 ga., 1-5/8 oz. (Fed.)	4-1/4 dram equiv.	1345	BB, 2
3", 12 ga., 1-1/4 oz. (Rem.)	MAX	1375	1, 2, 4
3", 12 ga., 1-3/8 oz. (Fed.)	3-1/2 dram equiv.	1235	BB, 1, 2, 4
3", 12 ga., 1-1/2 oz. (Win.)	MAX	1200	BB, 1, 2, 4
2-3/4", 12 ga., 1-1/8 oz. (Fed., Rem.)	3-3/4 dram equiv. or MAX	1365	1, 2, 4
2-3/4", 12 ga., 1-1/4 oz. (Fed., Rem.)	3-3/4 dram equiv.	1330	BB, 1, 2, 4
3", 20 ga., 1 oz. (Fed.)	3-1/4 dram equiv.	1335	4
2-3/4", 20 ga., 3/4 oz. (Fed.)	3-1/4 dram equiv.	1425	4

For the past three waterfowl seasons extensive lethality data on the field performance of No. 6 steel shot (.011") has been gathered by the author using experimental one ounce and 1-1/8 ounce, 2-3/4" 12 gauge loads of steel shot possessing a nominal velocity of 1360 fps. In addition, Federal Cartridge Corporation custom loaded during the fall of 1982 2-3/4",

12 gauge, 1-1/8 ounce loads of No. 6 steel shot possessing a nominal velocity of 1365 fps for the South Dakota Department of Game, Fish and Parks for steelshot training sessions and for field testing on waterfowl and upland game birds. Federal previously loaded such shells in 1980 for the Illinois Department of Conservation for a steel vs. lead waterfowl cripple-swatting study and for a steel vs. lead dove shooting field test.

Federal Cartridge Corporation in 1982 also loaded experimental 2-3/4", 20 gauge 1425 fps, 3/4 ounce loads of No. 6 and No. 5 (.012") steel which the company distributed to select individuals and personnel of wildlife departments for evaluation and field testing.

COOPERATIVE INTERNATIONAL ASSOCIATION OF FISH AND WILDLIFE AGENCIES (IAFWA)/
NATIONAL WILDLIFE FEDERATION (NWF)

After the FWS's position paper on steel shot was presented by the Director at the North American Wildlife and Natural Resources Conference in March of 1982, several states with existing steel shot zones moved through the Migratory Wildlife Committee of the IAFWA to begin a national program on non-toxic shot. The program was proposed in recognition of the fact that the federal government would no longer be conducting research on the performance of steel shot loads, nor in educating the public in the proper selection and use of steel shot, nor would it any longer be taking a leadership role in steel shot matters as it traditionally had done in the past. States were polled through flyway councils as to the need for and their willingness to financially support a national non-toxic shot information, education, and research program directed by and answerable to the states. Preliminary state interest was deemed high. Via the Migratory Wildlife Committee cost estimates, goals, and objectives for such a program were discussed and sent each state during the late spring of 1982 (Clark, pers. comm.). The National Wildlife Federation (NWF) also expressed interest in such a program and proposed that it be a cooperative state/NWF venture, with the Federation serving as a clearinghouse for information dissemination and to administrate fiscal matters (Wentz, pers. comm.).

As a result, the Cooperative International Association of Fish and Wildlife Agencies/National Wildlife Federation Lead Poisoning Control Information Program was implemented (IAFWA, Migratory Wildlife Committee 1982). By action of the board of directors, the official program name has been abbreviated to the Cooperative Lead Poisoning Control Information Program and is popularly referred to by its acronym, CLIP. The CLIP program is open to any state wildlife department or interested private sponsor which may become a member by contracting with the National Wildlife Federation for the services of the program. Currently full supporting membership for states requires an annual contract for services of \$1,500.00 per annum, and for private industries or entities, \$5,000 per annum. The fiscal year of the Program runs from July 1 to June 30 of each year.

The expressed goals of the program are to continue research into the effectiveness and limitations of current and new steel shot loads; to provide objective and unbiased educational services and materials regarding lead poisoning, steel vs. lead shot ballistics, the proper use and selection of non-toxic loads; and to serve as a clearinghouse for information relative to lead poisoning die-offs, steel or lead shot shooting tests, and crippling loss monitoring programs in non-toxic shot zones. The program guided by an Executive Board comprised of one member elected by contributing cooperators within each flyway, plus a member designated by the NWF, plus not more than two members appointed by the Chairman of the Migratory Wildlife Committee. The member designated by the NWF serves as executive officer of the program under the direction and guidance of the Board.

Currently there are 26 state contributing cooperators in the program and two private industries which wish to remain anonymous. The state contributing cooperators include:

Atlantic Flyway

7 states

Delaware, Florida, New Jersey, New York

North Carolina, Pennsylvania, and South Carolina

Mississippi Flyway	9 states Arkansas, Illinois, Iowa, Michigan, Mississippi Missouri, Ohio, Tennessee, and Wisconsin
Central Flyway	10 states Colorado, Kansas, Montana, Nebraska, New Mexico North Dakota, Oklahoma, South Dakota, Texas and Wyoming
Pacific Flyway	None

Of the 31 states which currently have some type of steel shot zone within their boundaries, 20 states or 65% are members of the Cooperative Lead Poisoning Control Information Program. The other six current state members of the Program (Arkansas, Montana, North Dakota, South Carolina, Tennessee, and Wyoming) have no steel shot zones.

By flyway, current contributing membership in the Program among the 31 states having steel shot zones of some kind is:

Atlantic (7 of 10 states):	70%
Mississippi (7 of 11 states):	64%
Central (7 of 7 states):	100%
Pacific (0 of 3 states):	0%

There are three additional states which have expressed interest or made commitments to becoming contributing cooperators in the Program beginning in the second (1983) fiscal year. They are Kentucky, Mississippi, and West Virginia. Of these one has steel shot zones (Mississippi), while two (Kentucky and West Virginia) have no zones at all.

DISCUSSION

The current position of the U.S. Fish and Wildlife Service regarding steel shot has been interpreted by numerous states to mean the future direction of any national steel shot program has essentially been passed from the federal government to the states.

Originally non-toxic shot zone regulations required the use of steel shot in 12 gauge guns only for hunting waterfowl principally over water areas. Over the past three years the trend has been to broaden the required use of steel shot to all gauges. Additionally in an effort to substantially reduce further deposits of lead in the environment, the trend has been to amend regulations to require the use of steel shot for hunting waterfowl over all water and dry land areas within zone boundaries. Several states recently have been considering regulations that would require the total use of steel shot on all water and land areas for all shotgun hunting of small game whether the target species be waterfowl or upland game within established non-toxic shot zones. In general, the three year trend among most states containing some kind of non-toxic shot zone has been toward expanding the required use of non-toxic shot within zones (U.S. Fish and Wildlife Service 1981, 1982, and 1983).

Since 1976 while some states have taken little or no action to establish steel shot zones, others have developed comprehensive regulatory programs that are designed to be expanded until lead poisoning is judged to no longer be a threat to waterfowl in these states. Among the leaders in this area are the ten states in the Central Flyway that have adopted a Flyway-wide resolution to eliminate the use of lead shot for all waterfowl hunting in the Central Flyway by 1985.

The flyway with the lowest number of states containing non-toxic shot zones, and the flyway with the least total geographic area contained within such zones remains the Pacific. The Pacific Flyway is also the only flyway in which the state which winters the majority of that flyway's annual fall flight of ducks (California) contains no steel shot zones.

Non-toxic shot regulations, and the performance characteristics and bagging/crippling capabilities of steelshot loads have been involved in more litigation than, perhaps, any wildlife issue in recent history. The record shows, however, that in all five court cases involving steel shot, the court decisions have upheld the steel shot regulations in question. Additionally, in every case in which plaintiffs alleged steel shot would cripple more ducks than lead shot, the court has failed to find evidence that steel shot loads will cause greater wounding losses to continental populations of waterfowl than lead shot loads.

Steel shot loads have been expanded in commercial shotshell offerings to include the 10, 12, and 20 gauges. These gauges encompass more than 95% of all the shotshell loads used annually for waterfowl hunting. Current commercial steel shot loadings are limited to shot sizes No. BB, 1, 2, and 4. The lack of available steel loads with shot sizes smaller than No. 4 restricts those employing steel shot for hunting ducks. Steel pellet sizes smaller than No. 4 may prove to be more efficient for the taking of ducks than steel pellet sizes No. 4 and larger, especially in the 20 gauge. The unavailability of commercial steel loads possessing pellet sizes smaller than No. 4 handicaps states wishing to require non-toxic shot for upland game hunting within non-toxic shot zones. Further research into the efficacy of steel loads containing pellet sizes smaller than No. 4 for waterfowl and upland game hunting is needed.

In response to the U.S. Fish and Wildlife Service's current position on steel shot, the Cooperative Lead Poisoning Control Information Program was formed. In its first year of existence the Program was joined by 61% of the states possessing steel shot zones, with an additional five states joining which possess no non-toxic shot zones, together with two private corporations which choose to remain anonymous. Together with the three other states which have indicated an interest in joining during the Program's second fiscal year, a substantial interest in continuing the use and expansion of non-toxic shot has been displayed among state wildlife departments and the private sector. Currently, however, although several have expressed interest, no state in the Pacific Flyway has as yet joined the Program.

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