

## **Lead Poisoning in Iowa Wintering Bald Eagles**

Kay Neumann, B.A., M.S.  
Executive Director, SOAR  
[www.soarraptors.org](http://www.soarraptors.org)

First of all, a huge thank you is in order for all of the naturalists who take time out of their busy days to rescue wild animals in distress. Your efforts to search out, capture, and transport these animals to licensed rehabilitators is much appreciated. The public relations value of showing some caring and compassion for wildlife goes a long way in generating support for your organization as well. Besides trying to save individual animals, the majority of which are suffering from human-related injuries, rehabilitators are able to capture a sample of the factors that are causing mortality in wildlife populations. Most of these are miscellaneous, accidental traumas caused by cars, power lines, fences, and windows. Some mortality (i.e., a gunshot wound) is the result of illegal activity and preventable with more education. SOAR deals mainly with raptor patients, which are given complete protection under both state and federal laws. Some mortality is frightening, in that it could have a detrimental effect at the population level. Lead poisoning in bald eagles falls into this last category. Hopefully, the data gathered by rehabilitators can be an early warning system. That can alert us to potential problems and we can act to correct them before serious declines in population are seen and situations reach the emergency level.

So again, your help is needed. After three years of gathering as much data as possible on bald eagles admitted to rehabilitators from across the state, it appears that the main source of ingested lead is from lethally wounded and non-retrievable deer carcasses and possibly, gut piles. There is an amazingly simple solution that would prevent the suffering and death of many bald eagles in Iowa each winter; solid copper deer slugs. I know that before you launch into an effort to get deer hunters to switch to a different, non-toxic, type of ammunition, you will want some convincing evidence.

### **The Problem**

In the fall and winter of 2004 – 2005, it began to seem as if it were raining sick, dead, and dying eagles. It was expected that we would see more eagles coming into rehabilitation facilities just as a matter of the numbers game. Bald eagles have made a marvelous comeback from our twice almost losing them; in the late 1800s and early 1900s settlers almost wiped them out by shooting them on sight and in the 1940s and 1950s the pesticide DDT brought them to a low of 500 pairs within the lower 48 states. Now, with protective regulations and more environmentally wise chemical use, we have over 200 nesting pairs in Iowa and wintering numbers in the thousands. It would stand to reason that with more eagles around, more would suffer from randomly caused injuries. This, however, was not the case. It wasn't a broken wing here, a broken leg there, a poke in the eye; it was lead poisoning case after lead poisoning case. Of the thirty-two bald eagles that SOAR has attempted to gather data on (beginning in February, 2004 to December, 2006), twenty-four were tested for lead poisoning with either a blood test or a liver biopsy. Seventeen of these twenty-four (70 %) showed

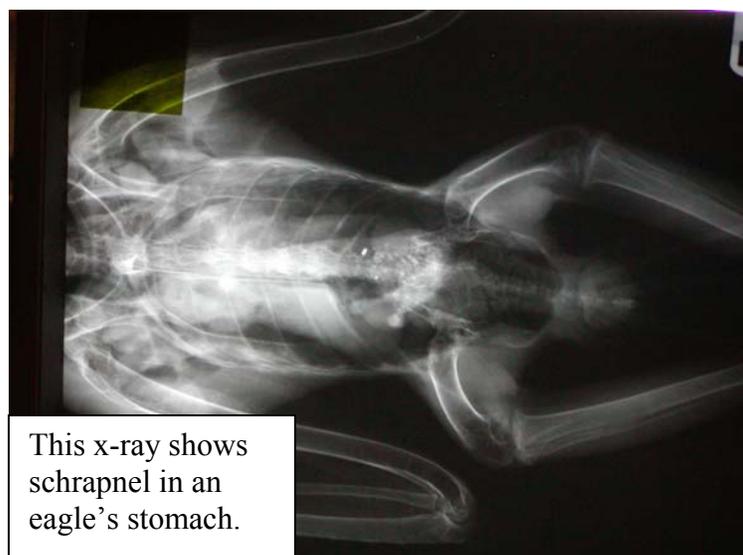
poisoning levels with either above .2 ppm lead in their blood or above 6 ppm lead in their livers. Two more birds showed exposure levels (they have a higher than normal level, but have not reached a poisoning (lethal by itself) level), above .1 ppm in their blood. This is not a random, insignificant cause of mortality. Of the eight birds that were not tested: four exhibited no lead poisoning symptoms, had normal recoveries, and were released; two were exhibiting lead poisoning symptoms, but were transferred to out-of-state facilities and lost from the data set; and two were euthanized on admission due to significant, non-repairable trauma.

One effect that has been documented with this data gathering effort is secondary trauma resulting from lead poisoning. Lead poisoning or exposure can cause vision problems and adversely affect the nervous and respiratory systems. Lead interferes with hemoglobin (the oxygen carrying component of red blood cells) leading to anemia and respiratory distress. Several eagles were admitted as trauma cases and also showed elevated lead levels in their blood. Leading to the conclusion that because of the effects of lead in their system, they were less wary, vision impaired, and were more likely to suffer traumatic injuries. This is also something to consider when looking at the available data. When an eagle's cause of death is listed as trauma, but no blood tests or liver biopsy has been done, the underlying cause may be lead poisoning. I'm sure that during this time frame eagle carcasses have been found and turned into the USFWS. I have not included any of this data, and am uncertain of the amount of lead testing being done on these carcasses. The data SOAR has been gathering only reflects the birds that are found and brought to rehabilitators. We do not know the multiplier of how many eagles die and are never found or reported. If anything, the incidence of lead poisoning that we are measuring in bald eagles is under reported.

Lead poisoning is difficult, at best, to treat. We have been using the same chelation therapy medications that are used for humans with lead poisoning. Needless to say this is an expensive treatment, approximately \$300 per bird for the medication alone. Of the seventeen eagles diagnosed with lead poisoning, thirteen have died and the other four are unreleasable due to secondary trauma issues. Not very good success, but when birds are admitted with many times the lethal level of lead in their systems, the only thing we can do is try. I think the data, thus far, establishes that there is a problem. Now, where is it coming from and what can we do about it.

### **The Source**

An attempt was made to x-ray eagles on admission to look for lead in their digestive tracts. Systemic lead poisoning comes from lead being eaten or ingested. An eagle that has been illegally shot will usually not develop lead poisoning from ammunition fragments lodged in their muscle. It is very difficult to



This x-ray shows schrapnel in an eagle's stomach.

find the lead still in their digestive tracts, usually by the time poisoning symptoms begin to appear, the lead has been processed through their systems. To-date four x-rays have been taken that show shrapnel or fragments of lead and one that shows number six shot in eagle digestive tracts. The three shrapnel and one shot x-rays were taken by MacBride Raptor Project before February 2004 and do not appear in the data set SOAR has been working with. Children presented to clinics with lead poisoning symptoms are not rushed off for an x-ray to look for paint chips in their stomachs, they are given a blood test and chelation therapy is started depending on the results of the test. The way that researchers determined that paint containing lead was the main source of lead poisoning in children, was to watch their behavior and analyze their environment for potential sources. This is also the path we have tried to follow to determine the main source of lead poisoning in bald eagles.

The fact that the eagles need to eat the lead means that it must be contained in something worthy of being eaten by an eagle. Yes, that's a wide range of items. The first thing that comes to mind is their preferred meal; fish. The Iowa Department of Natural Resources (IDNR) has been conducting fish tissue sampling work for more than ten years across the state. They have found the fish in Iowa to be safe for human consumption with no elevated lead levels. Fishing tackle was examined as another possible source. The time-of-year data of the poisonings did not fit with the major fishing months, nor did the x-ray evidence suggest tackle.

<b>month</b>	<b>Total number of eagles admitted with positive tests for lead poisoning</b>
November	2
December	7
January	2
February	1
March	4
April	1



An eagle photographed by a trail cam in early March 2006 feeding off of a deer carcass.

Cases of eagles with lead poisoning peak in December (shotgun deer season) and March (as eagles head back north to nest they seem to scavenge more as they make this cross country migration). Lead poisoning cases have not been seen during the summer and early fall months (May – September). The main food item available during the winter months that may contain lead seems to be deer carcasses and possibly gut piles.

X-rays of a deer carcass that was shot with two with lead deer slugs, reveals that the main body of the slug traveled completely through the deer, but lead schrapnel fragments were left in the carcass at the points where the slugs passed through and shattered bone.

This schrapnel looks quite similar to the irregular schrapnel pieces found in eagle digestive systems. In this x-ray of a deer's mid-section, you can see the lead fragments where the slug went through the ribs below the spine and grazed the top of the spine. We did not x-ray gut piles, but it is on my to-do list.

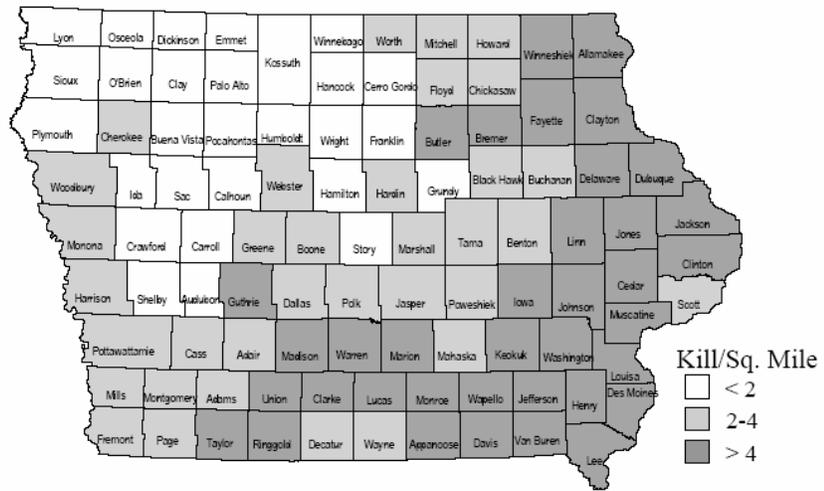


It is interesting to look at the deer harvest data. The IDNR has been gradually increasing the number of deer harvested as part of their management strategy for the species. This has certainly made gut piles more plentiful and probably carcasses. I do not know of a way to calculate the number of deer wounded and not retrieved. As I spoke to a hunter safety class about eagles and asked what they could do to help, one student responded that he would retrieve everything he shot. That is a wonderful concept, but not possible in reality. Anyone who hunts knows that no matter how careful you are, you may be unable to locate wounded animals and with deer, a wounded animal may not be obvious immediately after being shot. With over 200,000 deer harvested in 2005 and most of the state seeing more than two deer killed per square mile. This suggests that deer carcasses and gut piles would be an increasingly available food source for wintering eagles.

Table 1.4 Historical data on deer harvest by license type (1985-present). Totals include IAAP harvest, special management unit hunts, nonresidents and youth.  
(Year summaries prior to the first year given are archived at <http://www.iowadnr.com/wildlife/>)

Year	Regular Gun			Muzzleloader			Archery	Grand Total
	Paid	Landowner	Total	Early	Late	Total		
1985	32,613	5,344	37,957		457	457	5,805	44,219
1986	41,352	10,378	51,730	349	728	1,077	9,895	62,702
1987	53,230	10,270	63,500	1,509	1,027	2,536	9,722	75,758
1988	66,757	13,298	80,055	1,835	1,294	3,129	9,897	93,756
1989	67,606	12,963	80,569	2,619	3,715	6,334	11,857	99,712
1990	69,101	9,095	78,196	2,819	5,884	8,703	10,146	98,002
1991	56,811	11,575	68,386	3,120	2,766	5,886	8,807	83,635
1992	50,822	10,453	61,275	3,316	3,231	6,564	8,814	77,684
1993	52,624	8,354	60,978	2,219	2,883	5,102	9,291	76,430
1994	59,054	8,735	67,789	2,610	3,196	5,806	12,040	87,231
1995	65,206	7,917	73,123	2,831	3,408	6,363	13,372	97,256
1996	71,577	10,896	82,473	2,895	4,558	7,453	12,314	107,632
1997	77,169	10,588	87,757	4,062	5,508	9,570	14,313	118,404
1998	73,165	9,989	83,154	4,448	5,343	9,791	12,302	112,608
1999	74,362	12,966	87,328	5,277	5,329	10,606	15,266	121,635
2000	77,743	13,189	90,932	4,585	5,936	10,521	17,727	126,535
2001	82,721	14,801	97,522	4,593	7,320	11,913	18,798	136,655
2002	77,940	18,932	96,872	5,091	7,772	12,863	20,703	140,490
2003	96,757	25,353	122,110	6,155	12,049	18,204	26,486	182,856
2004	97,830	26,333	124,163	6,818	13,550	20,368	30,025	194,512

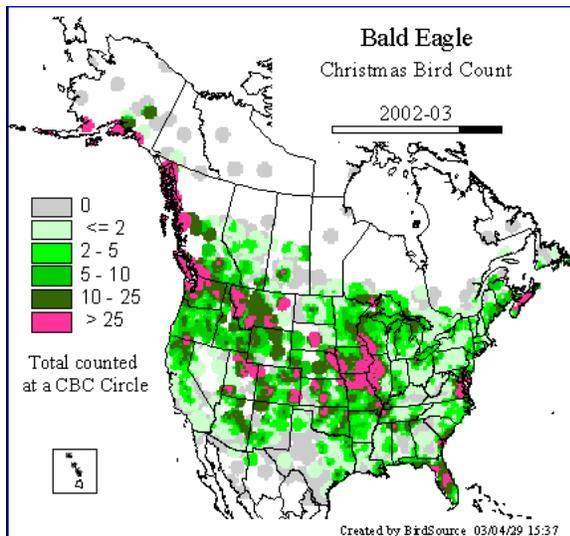
Fig 1.5 The average number of deer killed per square mile in each county during the 2004 - 2005 deer season.



Iowa Department of Natural Resources. 2005. Trends in Iowa Wildlife Populations and Harvest - 2004, Iowa Department of Natural Resources - Wildlife Bureau, Des Moines, Iowa. 204pp.

There are also more eagles here during the winter time. Iowa seems to rival Alaska for the number of wintering eagles on the Christmas Bird Counts. The Iowa Mid-winter Eagle Survey also reflects this increase. The decrease in eagle numbers in 2005 is certainly worth noting, but is most probably weather related. The Mid-winter survey is meant to be used

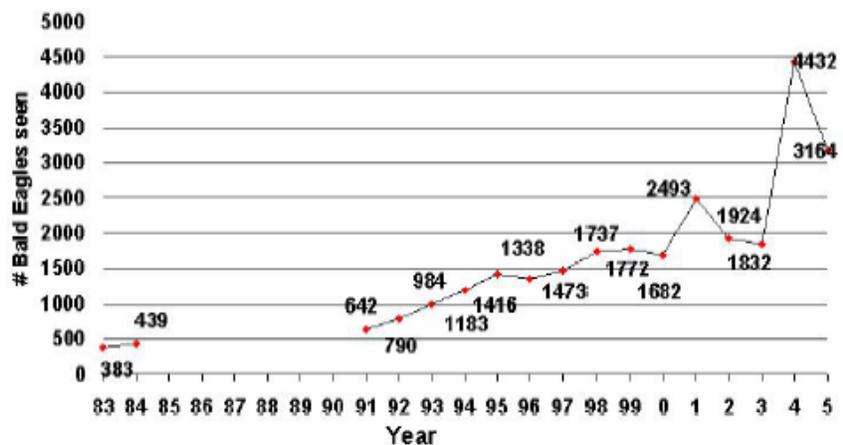
as an index over time and will certainly be data worth watching. The IDNR has simultaneously increased the harvest of deer in the state. The majority of this harvest is done with a lead slug.



These combined factors have brought the level of lead poisoning in Iowa wintering bald eagles to a noticeable level. We need to remember lessons from the past; eagle populations need protective regulations preventing shooting and nest destruction, eagle populations need a clean environment, and if we wait again until a threat becomes a catastrophe we will most probably be sorry.

Please remember that most wildlife rehabilitators operate as volunteers with very narrow budget margins. I understand that the information we have gathered so far is incomplete; an x-ray/blood test/liver biopsy was not done on every single animal.

Figure 15.4 Number of Bald Eagles seen during Iowa mid-winter survey 1983-Present



These tests are not free, and we have done the best we could with the resources available to us. I feel that this is enough evidence to point to a problem with lead and eagles, that the most likely source in Iowa during the winter is deer, and that urging hunters to switch to non-toxic copper deer slugs is warranted immediately. I also feel that more scientific research is needed. What are the lead levels in free ranging eagles in Iowa? Lead poisoning and exposure are insidious. Eagles, just like children, can function with lead in their systems, but not at their best level. It may effect their reproduction, longevity, and overall health. What are the long term effects of this?

### **The Solution**

Bald eagles are listed as an endangered species in Iowa and as a federally threatened species. Any evidence that points to a problem that might hinder their recovery should be taken seriously. There are many public hunting areas that already require the use of non-toxic shot, eliminating all lead containing ammunition would be a logical next step. As the IDNR seeks stable funding sources in the form of a portion of the sales tax, the agency must keep in mind the management of all of Iowa's resources and both their

consumptive and non-consumptive users. With ammunition manufacturers making available all sorts of non-toxic alternatives, it makes the solution very easy.

Hunters can show that really care about our natural resources by using non-lead ammunition.



### **References and Resources:**

A special thanks to MacBride Raptor Project, Cedar Rapids, Wildlife Care Clinic, Ames, Orphaned and Injured Wildlife, Inc., Spirit Lake, and Raptor Resources, Bluffton, for their work with rehabilitating eagles and data collection.

[www.soarraptors.org](http://www.soarraptors.org) – for the complete data set on eagles admitted to rehabilitators from February 2004 to December 2006

[www.iowadnr.com](http://www.iowadnr.com) – for the complete reports on deer harvest information, mid-winter bald eagle surveys, and fish tissue sampling

[www.hawkwatch.org](http://www.hawkwatch.org) – for a downloadable report on 40 years worth of research on lead poisoning and wildlife and several printable fact sheets on the topic