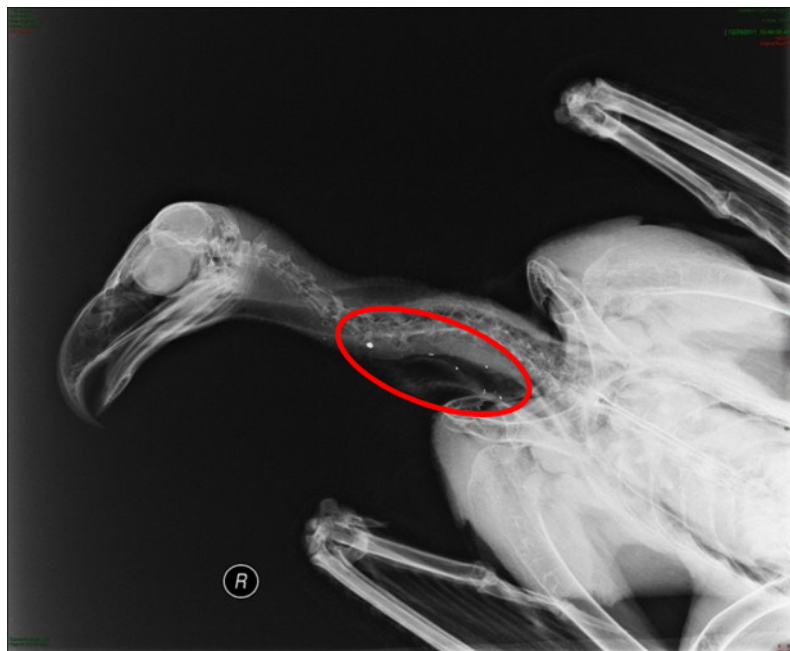




Monitoring Lead Contamination in Bald Eagle Nestlings

Why and How We Monitor

- Lead is a toxic metal with restricted uses in gasoline, paint, and pesticides. Though it is no longer used in ammunition for waterfowl hunting, lead is still used in ammunition for hunting upland game (e.g. deer and grouse), shooting sports, fishing tackle, batteries, tire weights, and many other products.
- Lead can enter the environment directly (e.g. lost fishing tackle) or through the waste stream. Even at low levels it can cause behavioral problems and adverse health effects in children. The Centers for Disease Control and Prevention (CDC) has determined that 5 micrograms of lead in a deciliter of a human child's blood (ug/dL) is the threshold for seeking medical attention¹. Lead also affects wildlife. Bald eagles and other species high on the food web are especially susceptible.
- To understand the patterns and levels of lead in the environment, we are sampling blood and feathers from nestling bald eagles in Mississippi National River and Recreation Area (MISS), St. Croix National Scenic Riverway (SACN), and Apostle Islands National Lakeshore (APIS). Eagles feed mostly on aquatic life from a local territory, making them excellent indicators of local contamination.



Lead fragments in the crop (throat pouch) of an adult bald eagle appear as bright spots in an X-ray. This bird died from lead poisoning. *Photo courtesy of the University of Minnesota Raptor Center.*

What We're Finding

We measured lead levels in feathers of 223 bald eagle nestlings from 2006 through 2011. **Nestlings from APIS and the upper reaches of the St. Croix Riverway (U-SACN) had low levels**, with 62% showing no detectable lead (Figure 1; left panel). **Yet, 75% of nestlings sampled on the lower St. Croix (L-SACN) and at MISS had measurable levels, with some areas being consistently high.** The large percentage of eaglets exposed to lead indicates it is a chronic contaminant in the aquatic system.

Bald eagles slowly excrete lead into their feathers as they grow so that the amount found in the feathers we collect represents an accumulation over the 20-60 days since hatching. But not all lead is excreted in the feathers. A portion is absorbed and can interfere with neurological development in young animals.

The good news is that **lead in nestling feathers has declined significantly in all three parks** (Figure 2). This decline coincides with decreasing levels recorded in the air since 1980, following laws passed in 1973 that restricted lead in gasoline². Unfortunately, this will not stop the acute (sudden onset) poisonings caused by direct ingestion of lead.

Lead levels in eaglet feathers provide a measure of average exposure, but wildlife often succumb to acute poisoning after eating a lead-poisoned meal. In 2011 we measured lead in nestling blood where levels will rise more quickly after ingestion (Figure 1; right panel). The distribution of nestlings with high levels of lead in their blood is much more dispersed than for feathers.

Management Implications

The highest level we found in nestling blood was 9.6 ug/dL — about half of what's considered excessive for an *adult eagle* (20 ug/dL). There is no similar gage of poisoning for nestlings, but nestlings are smaller than adults and the lead exposure is occurring at a critical time in their development. It is also noteworthy that two nestlings on the lower St. Croix in 2011 had blood levels higher than the threshold for human children.

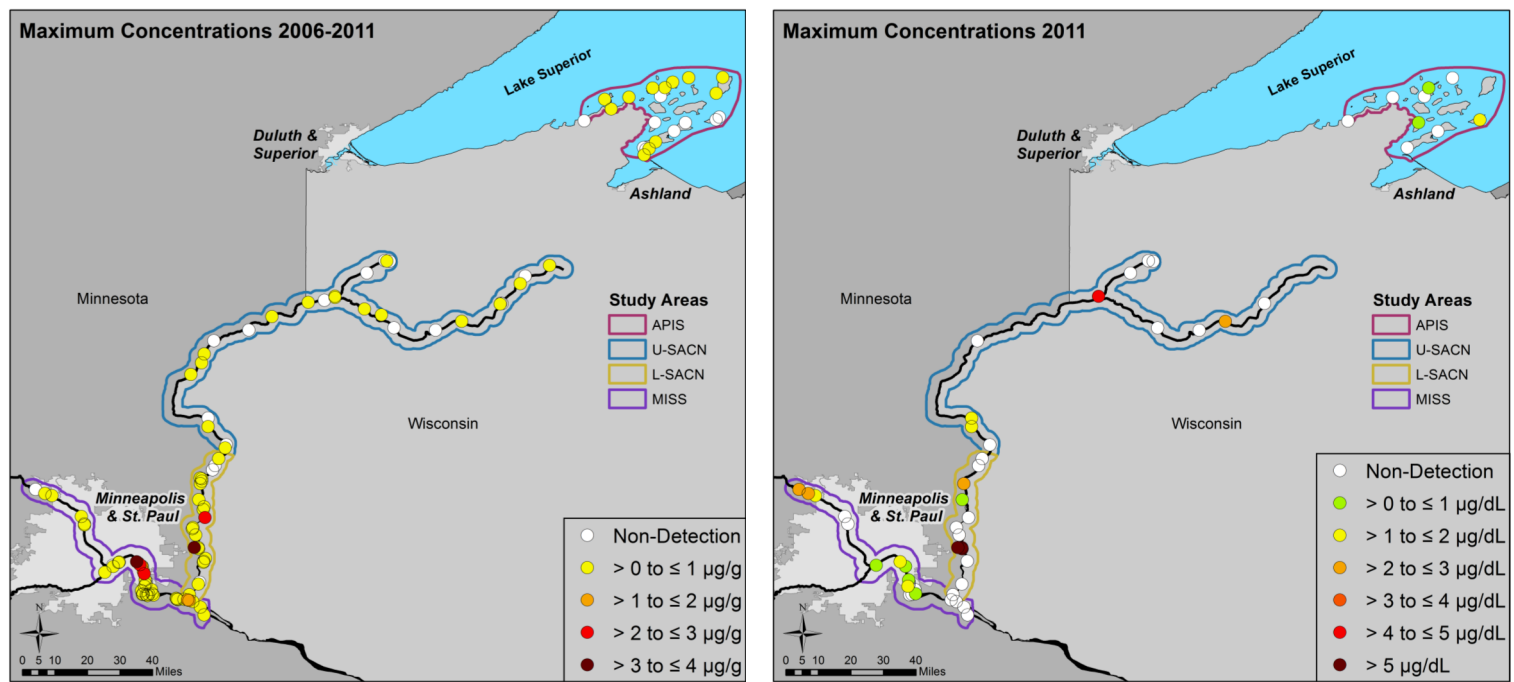


Figure 1. Spatial distribution of lead in feathers (left panel) and blood (right panel) of bald eagle nestlings. Feather samples are from 2006–2011 and the map shows the maximum value for each nesting territory. Blood samples are from 2011 only. Note two nestlings from territories immediately adjacent to each other on the lower SACN had the highest levels recorded.

Most lead poisonings that we hear about in wildlife are in adult bald eagles. About 25% of the bald eagles admitted to the University of Minnesota Raptor Center suffer from lead poisoning³. The Center finds a peak in poisonings after the deer gun hunting season. Adult eagles often feed on the remains from deer left in the woods by hunters, and these remains can have fragments of lead from the ammunition (see front photo). These poisonings often go unreported, especially in remote areas, but in

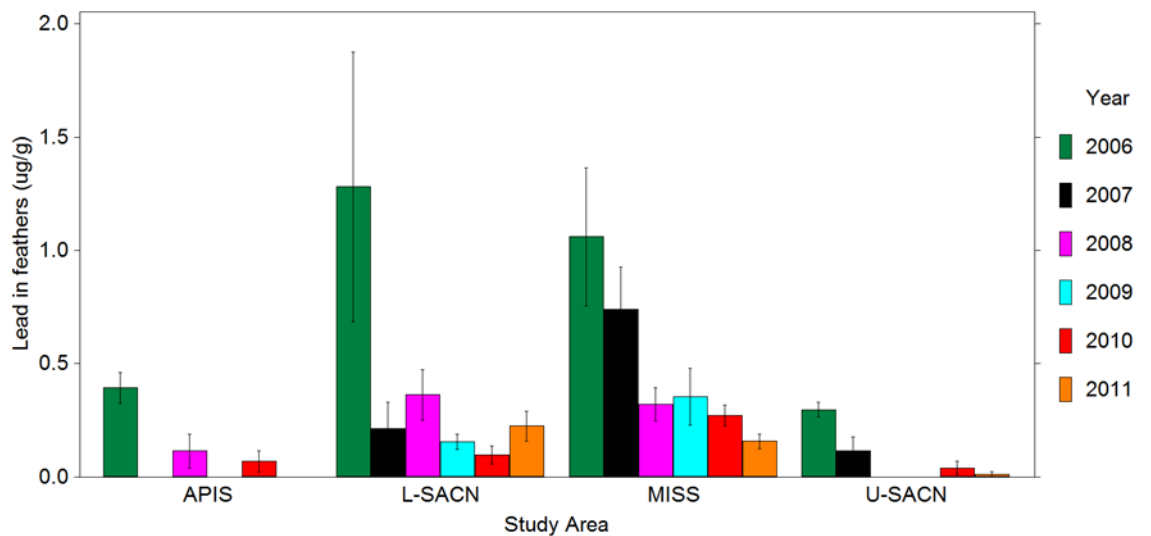


Figure 2. Levels of lead found in feathers of bald eagle nestlings 2006-2011.

December 2012 two adult eagles died from lead poisoning about 5 miles west of Apostle Islands National Lakeshore.

The National Park Service participates in “Get the Lead Out” programs and accordingly has taken steps to reduce lead in park operations. Each park can educate their visiting public of the dangers of lead — both to humans and to wildlife — and promote the use of lead-free ammunition and fishing tackle. Parks can work with state and local authorities to evaluate the source of lead in areas where feathers show consistently elevated levels (such as in South St. Paul, MN). The Great Lakes Network will continue to monitor lead in both feathers and blood of nestling bald eagles in the coming years.

References

- 1 = Centers for Disease Control and Prevention: <http://www.cdc.gov/nceh/lead>.
- 2 = U.S. Environmental Protection Agency: www.epa.gov/airtrends/lead.html.
- 3 = University of Minnesota Raptor Center: www.raptor.cvm.umn.edu/MedicalServices/RaptorMedicine/LeadPoisoning/home.html.