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The Effect of Lead Sinkers on Waterfowl

Lead has been recognized as a detrimental substance to waterfowl as attributed to lead toxicosis. Lead sinkers and jigs are the main cause of lead toxicosis in loons, especially when lead accumulates in heavy fishing areas.

In North America, the Common Loon is most commonly reported as dying from this cause, although at least 23 other species...are vulnerable. Bans on the use of lead fishing weights have been imposed in Yellowstone National Park, Redrocks Lake National Wildlife Refuge, and the National Elk Refuge in the USA. 22% of 202 Common Loons found dead in New England had ingested lead objects, principally sinkers and jigs. All of the loons that had ingested lead were adults representing 38% of the 115 adults examined. The percentage is even higher if birds collected only from fresh water are considered, i.e. 57% of 74 adult birds. These results show that lead toxicosis is a major mortality factor for Common Loons in Eastern North America, although the data probably represents a portion of the birds dying from this cause. Lead poisoned waterfowl commonly hide in dense cover as they become weaker, and are easily overlooked even by those searching for them (Twiss, 1998).

Through experimenting with captive waterfowl it has been shown that a single dose of .3 grams of lead per bird will result in death. Lead sinkers and jigs generally weigh between .5 and 15 grams, hence the ingestion of even one sinker will be fatal to the loon (Twiss, 1998). These sinkers and jigs present a problematic situation to waterfowl based on their feeding habits. Statistics illustrate that the Common Loon (*Gavia immer*) population, which is listed by the Vermont Non-game and National Heritage Program (NNHP) as a rare and uncommon native species (ftp://ftp.heritage.tnc.org/pub/nhp/us/vt/vt_anim.html#key), is in decline because of lead toxicosis.

What is lead toxicosis?

Lead toxicosis occurs "when liver lead concentration was 5.00 ppm or above," (Pokras 24). In a study conducted between April 1987 and June 1998 from loon carcasses collected from New England: of 396 loons, 103 had ingested lead objects and tested positive for lead poisoning, (Caldwell 4). "Each of the 103 loons was found to have ingested at least one lead object, yielding a total of 133 lead objects...approximately 95% of the lead objects were found to be less than 1.0 cm across, less than 2.5 cm long, and less than 10.0 g," (Caldwell 5). Therefore, this study found that the lead objects that cause toxicosis can be easily defined.

Why do lead sinkers and jigs present such a problem?

Loons, having no teeth, ingest their food whole. Consequently they must swallow small pebbles to help grind up the food in their stomachs. Lead sinkers and jigs can be mistaken for small pebbles and eaten by the loons. The sinkers and jigs are ground up in the loon's stomach and the lead is absorbed into the blood and tissues of the loon, leading to poisoning, (<http://www.bsc-eoc.org/loonfact.html>). Loons, may also eat fish that have lead

fishing gear attached. "In nearly one fourth of the cases of loons with ingested lead, other fishing gear (mostly hooks, swivels and monofilament) was present in the gastrointestinal tracts," (Caldwell 5). Loons may have a craving for lead and therefore seek out and ingest these objects. Evidence for this "is circumstantial, but does exist: a) loons are known to select individual stones, and thus determine which objects are ingested, b) sinkers found in gastrointestinal tracts appear worn, and none of the jig heads found in gastrointestinal tracts have attached fish hooks, implying that the jig heads had been in the environment long enough for their hooks to rust off, and c) mute swans that have been treated for lead toxicosis and then released, are known to have a high lead ingestion recurrence rate, which implies that the swans may have developed a taste for lead objects," (Caldwell 5).

What are the alternatives to lead sinkers and jigs?

Many non-toxic alternative sinkers and jigs are available. Currently there are, "22 alternatives on the market made out of bismuth, tin, stainless steel, tungsten, ceramic and natural granite...the cost of the non-toxic alternatives is slightly more expensive than current lead materials, adding between \$2-\$5.00 extra dollars a year to the cost of tackle for anglers, but amounting to less than 1% of total expenses associated with fishing over the course of the year." (<http://www.maineaudubon.org/ctest.htm>) Comparatively, the US EPA in 1994 calculated that additional costs to a shift to non-toxic alternative would be \$.31 per year. (Twiss, 1998)

Figure 1: Comparison of Lead and Alternatives

Material	Relative Toxicity to Waterfowl	North American Availability
Lead	High	Excellent
Steel	Low	Good
Bismuth/tin	Low	Moderate
Tungsten/bismuth/tin	Low	NA
Zinc	Moderate	NA
Molybdenum/polymer	Moderate(?) *	NA
Tungsten/polymer	Low (?) *	NA
* Probable toxicity of molybdenum and tungsten polymers is indicated as moderate or low, based on the known toxicology of these metals.		
Source: http://www.ec.gc.ca/cws-scf/pub/ops/op88/table7.html		

What is the status of loons in Vermont?

In Vermont loon breeding is rare, generally 6-20 occurrences, "they are believed to be extant and/or some factor(s) making it vulnerable to extirpation in the state." (ftp://ftp.heritage.tnc.org/pub/nhp/us/vt/vt_anim.html#key). The non-breeding status is apparently secure in the state with more than 100 occurrences. Loons are given a demonstrably secure global rank, while the state status is as endangered which therefore means they are protected by the Vermont Endangered Species Law (10VSA Chapter 123). Adopted on January 29, 1997, loon nesting sites between May 1 - July 31 are protected by a radius of 300 feet by all persons and vessels in public waters. These sites will be identified by signs and buoys as authorized by the Secretary of the Agency of Natural Resources, (<http://www.state.vt.us/wtrboard/rules/vupw.htm#S3.6>).

What are other states doing about this problem?

New Hampshire: Recently enacted a bill, "prohibiting the sale of lead fishing sinkers and lead jigs in fresh waters of the state, relative to lead studies and reports, and establishing a lead education program concerning the effects of lead on loons and other water birds and wildlife."

(<http://www.state.nh.us/gencourt/bills/98hbills/hb1196.html>). This bill was passed in 1998 and will be taking effect on January 1, 2000. The implications of the bill are that lead fishing sinker and jigs will be prohibited in this state, and anyone found in violation of this will receive a penalty not to exceed \$250. This will only apply to interstate lakes and ponds. The state will be developing an education program to include informational brochures, department sponsored training programs, posters, videos, and mobile displays for public events. (<http://www.state.nh.us/gencourt/bills/98hbills/hb1196.html>). Although the loon population in New Hampshire may be increasing, the effects of lead toxicity to loons and other waterfowl presents enough of a hazard as to make this bill significant. For instance, in 1997 eleven loons died of lead poisoning, this was about 2% of the state's 576 loons, (www.wildlife.state.nh.us/Fishing.htm).

Maine: In March of 1997 the state of Maine considered a bill to ban any sinkers or lures containing lead or zinc that weigh less than two ounces or measure less than one inch along their longest axis. Sally Stockwell a wildlife ecologist and Director of Conservation for the Maine Audubon Society testified in behalf of this bill. Stockwell led a study that discovered the leading cause of death among adult loons from 1989 to 1997 was lead poisoning from the ingestion of lead and zinc fishing sinkers and jigs. The study, done in conjunction with Tufts University, found that 47% of all dead adult loons collected from Maine freshwater lakes died from lead poisoning. Based on a study of 800 deceased loons in both the U.S. and Canada, 30% of loon mortalities are caused by lead poisoning from ingestion of sinkers and jigs. Despite the testimony of Stockwell an amendment was proposed to replace the bill. The amended bill simply allowed the commissioner of Inland Fisheries and Wildlife to accept donations of money, goods or services for the purpose of educating the public about the threat to loons and other bird species from discarded or lost lead sinkers and lures. This bill was enacted into law in 1997. (www.state.me.us/legis/opla/sub-web.htm)

New York: In February of 1999 a bill was introduced in the senate to "amend the environmental conservation law, in relation to prohibiting the sale and use of lead sinkers," (<http://www.assembly.state.ny.us/cgi-bin/showtext?billnum=S02592>). This bill (S02592) was referred to the Environmental Conservation Committee, and is therefore still pending.

Minnesota: In March of 1999 a bill was introduced in the house to authorize "grants to find a replacement for lead fishing sinkers and lead jigs," (<http://www.revisor.leg.state.mn.us/cgi-bin/bldbill.pl?bill=H1752.0&session=ls81>). Presently, this bill (HF 1752) is in the Environmental and Natural Resources Policy Committee, and is therefore still pending.

Works Cited

Caldwell, Jenna and Pokras, Mark A. "Sizes of Lead Objects Fatally Ingested by Northeastern Loons." TUSVM Wildlife Clinic

Pokras, Mark A. "Environmental Pathology of 124 Common Loons from the Northeastern United States 1989-1992." Tufts University School of Veterinary Medicine

Twiss, Marilyn P. "Preventing fishing-sinker-induced lead poisoning of Common Loons through Canadian policy and regulative reform." *Journal of Environmental Management*.

ftp://ftp.heritage.tnc.org/pub/nhp/us/vt/vt_anim.html#key

<http://www.ec.gc.ca/cws-scf/pub/ops/op88/table7.html>

<http://www.maineaudubon.org/ctest.htm>

<http://www.bsc-eoc.org/loonfact.html>

www.wildlife.state.nh.us/Fishing.htm

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