LEAD OBJECTS INGESTED BY COMMON LOONS IN NEW ENGLAND

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EXTENDED ABSTRACT.—Lead poisoning from ingested fishing gear has regularly been reported in four avian species: Common Loon (*Gavia immer,* Locke 1982), Mute Swan (*Cygnus olor*, Sears et al. 1989), Trumpeter Swan (*Cygnus buccinator*, Blus et al.1989), and Sandhill Crane (*Grus canadensis,* Windingstad et al. 1984). Aquatic birds may ingest lead objects while collecting gizzard stones or by preying on live bait or escaped fish with attached fishing gear. Evidence gathered from necropsies conducted at the Wildlife Clinic at Tufts Cummings School of Veterinary medicine suggests that ingestion of lead weights is the number one killer of breeding adult Common Loons in New England (Sidor et al. 2003). The current study quantifies the size, mass, and types of lead fishing gear ingested by Common Loons.

Between 1987 and 2000, 522 Common Loon carcasses were collected from the six New England states and submitted to the Tufts Wildlife Clinic for necropsy. Ingested lead objects were visually classified into the following six categories: Sinker, Jighead, Split Shot, Ammunition, Other (lead gear used for fishing that could not otherwise be classified, such as lead wires or tapes), and Unknown (original use could not be determined because of wear, fragmentation, or deformation). The recovered objects were weighed to the nearest 0.1 g (Pesola® spring scale), and a mechanical caliper (Fischer Scientific® type 6911) was used to measure length and width to the nearest 0.05 mm. Length was defined as the longest axis measurable, and width as the largest diameter perpendicular to the longest axis. Objects were then tested for lead using a commercial, buffered rhodizonate dye swab test (LeadCheck® Swabs, Hybrivet Systems, Inc). Toxicological analyses of loon body tissues were performed as described in Sidor et al. (2003).

Of the 522 loon carcasses examined, 118 (22.6%) had ingested lead objects (Figure 1). Of these 118 loons, 73 had more than one object in their gizzard, for a total of 222 lead objects recorded. The type of object ingested most frequently were sinkers at 48% of the total objects, followed by jigheads, split shot, and ammunition at 19%, 12%, and 11% respectively. The ammunition category consisted primarily of shotgun pellets, but also included one .22 caliber bullet and one .44 –.45 caliber bullet. Fifty percent of loons with ingested shotgun pellets had either two or three such projectiles present. About 36% of loons with ingested lead had other fishing-related objects (mostly hooks, swivels and monofilament line) present in the gastro-intestinal (GI) tracts. In this sample, all loons ingesting lead objects also had elevated liver lead levels consistent with lead poisoning.

Length, width, and mass varied among sinkers, jigs and split shot (Table 1). Of the 222 lead objects ingested, the largest weighed 25 g but 94% of them weighed less than 10 g. Over 94% were less than 25.4 mm in length, and 44% had a length of less than 10 mm (Figure 2). No jigheads recovered from the GI tracts had hooks remaining attached, thus length measurements of jigs includes only the lead portion.

Because of the grinding action of the gizzard and the presence of small stones against which the fishing gear is abraded, we suspect that measured sizes are somewhat smaller at necropsy than at the time they were first ingested by loons. Most ingested lead was similar in size to ingested stones, indicating loons may deliberately select lead objects because they fit whatever criteria birds have evolved to choose stones (Figure 2). While lead objects as small as 1 mm were found, no stones smaller than 6 mm were encountered. This may be explained by the fact that small stones can be passed out of the gizzard through the pylorus, while even the smallest lead objects would have inhibited gastrointestinal peristalsis and are more likely to be retained.

The sizes of lead fishing gear encountered in the current study shows very close correlation with the sizes found by Franson et al. (2003), even though the frequency of lead ingestion by loons in New England in that sample population was much lower (7.5%). One possible reason for this difference is that all but two of the New England loons sampled by Franson et al. (2003) were live birds, while the present study reports solely on dead loons submitted for necropsy. It would be expected to find a higher frequency of lead ingestion in a sample of dead and moribund birds than in a sample of live, apparently healthy birds.

One can make the argument that, given what we know about the toxicity of lead to loons, humans, and a wide variety of other species, every effort should be made to utilize non-toxic alternatives and minimize the introduction of lead into the environment. Barring the complete elimination of lead for such sporting uses, a clear understanding of the sizes and types of gear that pose the greatest threat to loons and other fish-eating species will allow us to formulate rational policies for the protection and management of these species. *Received 12 June 2008, accepted 20 August 2008.*

Figure 1. Radiograph of an adult Common Loon with an ingested lead sinker and jighead present in the gizzard.

Table 1. Dimensions of sinkers, jigheads and split shot recovered from 522 Common Loon carcasses collected from 1987 to 2000.

Lead Object	Sample Size, n	Length (mm)			Width (mm)			Mass (g)		
		mean	median	range	mean	median	range	mean	median	range
Sinkers	107	14.03 (±6.47)	12.7	4.0–40.2	5.89 (±2.55)	5.5	0.3–15.2	4.04 (±4.63)	2.4	0.3–25.0
Jighead	41	16.53 (±6.58)	15.3	5.2–33.6	6.55 (±2.33)	6.0	3.0–13.9	3.89 (±3.64)	3.18	0.3–18.1
Split Shot	26	5.79 (±2.33)	6.10	1.2–9.9	4.85 (±1.68)	4.5	1.5–8.13	1.60 (±1.04)	1.4	0.3–5.7

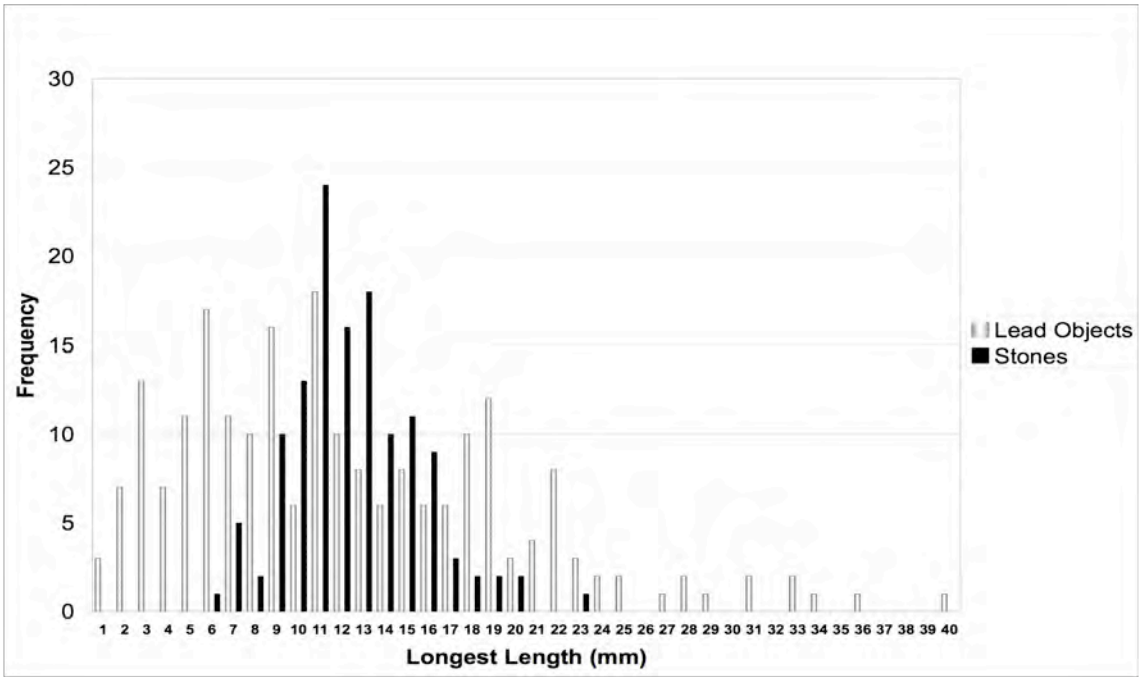

Figure 2. Lengths of lead objects and stones recovered from the ventriculus of 522 Common Loon carcasses.

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