Concours de VULGARISATION SCIENTIFIQUE 2023

NOUVELLE GAGNANTE

CATÉGORIE : SCIENCES NATURELLES ET GÉNIE

Where does hunting lead the black bear?

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The history and toxicity of lead

The use of lead (Pb) dates to 6,500 BC and has been a key component in different applications throughout history. From the plumbing that carried water to our homes for generations, to the coins wielded to trade and pay taxes, to the bullets used for hunting, lead has been integral to human society for thousands of years. Its durability and low melting point made it easy to work with, and its dense, heavy nature made it ideal for diverse uses. Despite its advantages and widespread use, lead can be toxic and harmful to humans and animals if ingested or inhaled.

Hunting and environmental pollution

The effects of recreational hunting on wildlife are widely acknowledged, yet its contribution to environmental pollution remains under-researched. For instance, the use of lead ammunition can be a significant source of lead emissions, with the potential to harm both people and wildlife. Besides the toxicity of lead itself, another concern is that lead bullets tend to fragment upon impact, shedding metal fragments along the wound channel. These fragments can be found in the remains of hunted animals, both in the parts intended for human consumption and in the parts that are discarded and at the disposal of scavengers.

Evidence of lead pollution in black bear

A recent study by researchers from UdeS and other institutions in Canada, Norway, and Sweden, provided evidence on lead pollution. They investigated whether the density of big game (moose and white-tailed deer, Fig. 1A) influenced long-term lead exposure in American black bears in Quebec, Canada. To do so, they obtained teeth collected from legally harvested individuals (n = 80 females; n = 115 males) in 22 management units during the annual bear hunt in 2017-2018. These mammals are omnivorous and have been known to scavenge on the remains of animals left by hunters, which exposes them to lead from bullets that accumulate in their bodies, including teeth and organs. Teeth can be used to monitor long-term lead exposure as they accumulate high levels of lead. The researchers found that female bears in areas with a high density of big game had higher concentrations of lead on their teeth than those in areas with lower hunting density. They also found that older bears had higher concentrations of lead, since it accumulates over their lifetime. While bears may also be exposed to lead from other sources such as fossil fuels and soil ingestion, this study highlights hunting as a potential source of lead exposure in black bears, even if they only have access to the animal remains from hunting for a short time each year (Fig. 1B).

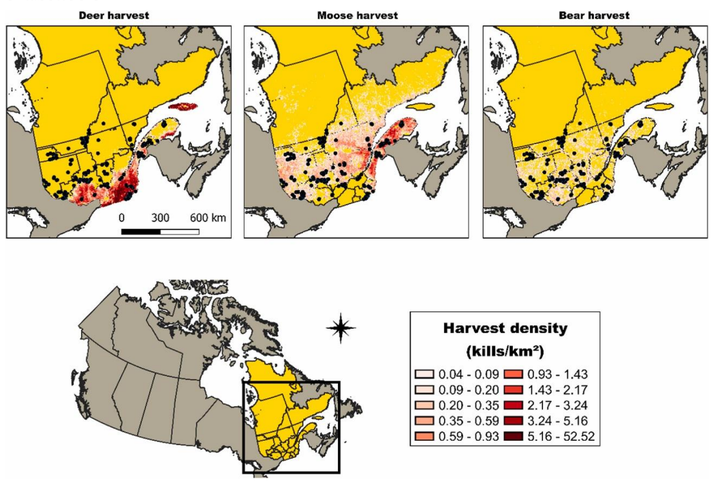
The risks of an "evolutionary trap" for scavengers

These results indicate that hunters may be inadvertently causing harm to scavengers by exposing them to lead through the animal remains they leave behind. The long-term benefits that scavengers gain from consuming these remains may be outweighed by the negative effects of increased lead exposure, potentially leading to unfavourable impacts on their health and survival. This situation is known as an ‘evolutionary trap’ because it lures scavengers into behaviours that are detrimental to their fitness. Therefore, this could lead to negative impacts on the health and survival of scavengers, possibly affecting their population levels and evolutionary potential.

Promoting alternative ammunition to reduce risks

The study highlights the need for further research on the impact of lead exposure on scavengers and alternative hunting methods to reduce risks to humans and wildlife. Our current hunting practices may be leading black bears into an "evolutionary trap" where scavenging benefits are outweighed by lead exposure. To prevent this, we must take steps to promote lead-free bullets or alternative hunting methods, such as bow or crossbow.

Panel A



Panel B

Figure 1: Panel A displays the big game harvest density (kills per square kilometer) in Quebec, Canada from 2013 to 2018. The harvest density is calculated as the number of white-tailed deer, moose, and American black bears hunted with firearms per square kilometer. Black dots on the figure indicate the location of the American black bear harvest (n = 195), while yellow areas represent regions where the harvest density was zero. This figure provides a visual representation of the distribution of big game harvests in Quebec during the specified period. Source: Brown et al., 2022. Panel B shows a black bear feeding on a carcase left by a human hunter, which is more likely to happen in areas with a higher density of big game. Unwittingly, the bear is ingesting lead remains that come from the bullets that killed the game, with potential harmful consequences for the bear’s health and survival. Source: Image generated by an artificial intelligence via ‘https://creator.nightcafe.studio/’.

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