

# Studying the Effects of Mercury on River Otter

By Sarah Spencer

Otters are helping us understand how environmental pollution affects wildlife and human populations. Because otters are at the top of the food chain, they become a good indicator of pollutants such as mercury in an aquatic ecosystem.

Mercury is a neurotoxin, which means it is a chemical that affects brain function. It and other heavy metals accumulate in concentration through food chains in a process known as bioaccumulation. Mercury concentration increases from water to aquatic plants to fish to fish-eating predators such as river otters, common loons, and humans.

The toxic effects of mercury on humans has been reported as far back as the 18th century, when workers in factories producing beaver felt hats from pelts preserved in mercury were reported to have “gone mad.” This is where the phrase “mad as a hatter” comes from. More recently, in the 1950s, people in Minamata, Japan, became ill after consuming fish and shellfish from watersheds contaminated with mercury from the run-off of a chemical plant.

In a study conducted in 1996, otter samples provided by trappers from southwestern Nova Scotia found otters from inland habitats to have mercury levels 10 times higher than those in coastal habitats. One explanation for the coastal inland pattern is the dilution of mercury



## About the river otter

The river otter (*Lutra canadensis*) is the most aquatic member of the mustelid family. Other members of the mustelid family include mink, weasels, and ferrets. The otter is Nova Scotia's largest freshwater predator. At maturity, this mammal weighs between 4.5 and 13.5 kg (10–30 lbs). It has glossy fur that is brown to black in color. The otter has small ears and long facial whiskers used to detect prey. Its long, narrow tail makes up 40 per cent of its total body length. Its webbed feet and streamlined body allow it to glide easily through the water.

Home range is the area in which an animal lives, reproduces, and obtains all of the necessities of life, including food and shelter. Home range is largely dependent on available food sources. Otters have been reported to travel up to 70 km (43 mi) in search of food. Despite this extensive travel, otters are rarely seen. They are secretive animals that choose habitats where human disturbance is minimal.

Otters consume a diet of 90 per cent fish. Other prey species include muskrats, waterfowl, reptiles, amphibians, crustaceans, and aquatic insects.

What is believed to be the oldest otter in North America (at 17 years of age)—was found in Hants County a few years ago.



Author setting up radio tracking antenna.

concentration due to the larger size of the ocean when compared to lakes and rivers.

To study this coastal/inland pattern further, nine otters have been live-trapped in southwestern Nova Scotia and surgically implanted with radio tracking devices to look for a relationship between where the otters spend their time and levels of mercury. During surgery, fur samples were removed from each otter in a simple and non-invasive procedure to test each animal for mercury. Animals were tracked by helicopter each week to determine the most frequently used area in the home range of each otter. By comparing the mercury level in the fur of each otter with the area in which it spends most of its time, mercury sources can be pinpointed.

In this study, otters from inland habitats have higher levels of mercury than the coastal otters. A mercury level of 20 parts per million (ppm) in fur can cause sub-lethal effects such as reducing reproductive success. Higher concentrations can cause death. Since older animals tend to have higher mercury concentrations, this difference could be due to the age and size of fish they are eating. One otter that was

live trapped from an inland habitat had a fur mercury level of 92 ppm. This is cause for concern.

So why is mercury so high in Nova Scotia? Although we have no definite answer, we have three strong possibilities:

- **acid rain**—We receive pollution from both the United States and the more industrial parts of Canada. What rises as smoke from plants across the continent falls as acid rain into our waterways.
- **erosion**—In southwestern Nova Scotia the bedrock supporting many lakes is composed of granite, limestone, and shale. Mercury is present in these rocks and is released into the water through erosion.
- **mining**—Decades ago, large-scale gold mining operations existed in that part of the province. Mercury is used in the mining process.

The results from this study will provide information about the health of the river otter population in southwestern Nova Scotia and will help wildlife biologists maintain and implement new management plans.

## Where does mercury come from?

Mercury is a heavy metal. It occurs naturally in the earth's crust in small amounts. Mercury is released into the atmosphere through both natural and man-made processes. Mercury is released by nature when bedrock erodes, volcanoes erupt, forests burn, or the earth quakes. Humans cause mercury to be released when we burn fossil fuels, burn municipal waste, flood land to create reservoirs, mine for gold, and smelt ore. We also extract mercury from the earth to use in consumer products such as batteries, thermometers, fluorescent light bulbs, and dental fillings.

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Otter trap site