Facts About ...

Mercury and PCBs in Lake Champlain

Mercury levels have substantially declined in three of the five most common sportfish in Lake Champlain since 1997

Why be concerned about Mercury & PCBs in Lake Champlain?

The primary health effect of mercury exposure is impaired neurological development, particularly in fetuses, infants, and children. Poly-chlorinated biphenyls (PCBs) have been shown to cause cancer in animals and are probable human carcinogens.

These toxins are of particular concern because they continue to accumulate over time, so older and larger fish have higher concentrations (bioaccumulate) and pose significant health risks to humans who consume fish in large quantities.

They pose the greatest risk to children and women of child-bearing age. Children's internal organs are more sensitive to toxins, and women can pass them to a developing fetus or to children through breast milk. For these reasons, New York, Vermont, and Québec have developed fish consumption advisories for Lake Champlain.

How do Mercury & PCBs enter Lake Champlain?

Mercury—the most widespread toxin of concern in Lake Champlain—is a naturally occurring element, but human activities have increased the amount released to the environment.

Household products containing mercury.

The main source of mercury is atmospheric deposition originating from coal-fired power plants, diesel combustion, and waste incinerators outside the Basin. Wind carries pollution from its source and delivers it to new locations in precipitation. Other sources include wastewater treatment effluent and leachate from landfills containing mercury-bearing products such as thermometers, fluorescent light bulbs, and dental amalgams. PCBs are more likely to enter the lake through runoff from industrial sites and roadways.

Smallmouth bass. Photo: BRI

PCBs in Cumberland Bay

Surveys conducted in the early 1990s identified two locations in the Lake with elevated PCB levels—Wilcox Dock in Cumberland Bay, NY and the inner harbor area at Burlington, VT. Wilcox Dock had the highest PCB concentrations found in the Lake. In 2000, a cleanup of the Cumberland Bay site led by the NYS Department of Environmental Conservation removed 150,000 cubic yards of PCB-contaminated sediment, sludge, and debris from the lake bottom and also restored wetlands and beaches.

Clean up in Cumberland Bay in 2000. Photo: LCBP

Adapted from the BRI Report

A Synoptic Assessment of Mercury and Re-evaluation of PCBs in Lake Champlain Fishes

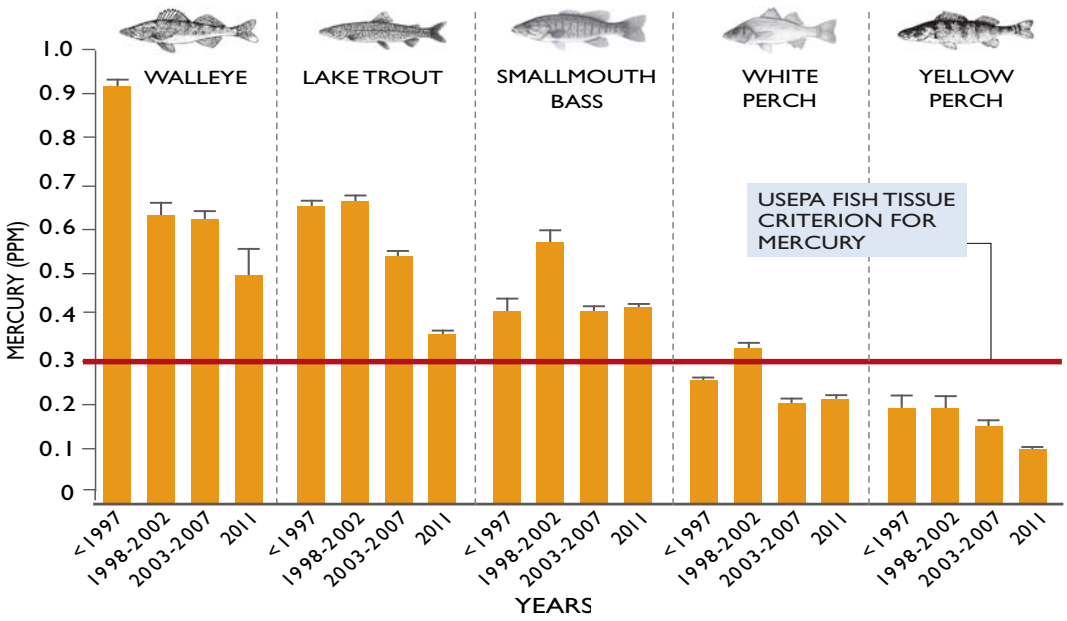
For more information on Mercury and PCBs, please visit the LCBP's *State of the Lake 2012* report at http://sol.lcbp.org/human-health_can-I-eat-the-fish-in-lake-champlain.html or scan this QR code with your smartphone.

What is being done to reduce these toxins?

Efforts to reduce mercury sources continue nationally with more stringent guidelines for mercury-producing industries and locally with enhanced recycling programs for products that contain mercury.

The Northeast Mercury Total Maximum Daily Load (TMDL), established by the U.S. Environmental Protection Agency (US EPA) in 2007, requires a 98% reduction in human-caused atmospheric sources of mercury originating from waste combustion sources in upwind states outside of the region (prior management of combustion sources had achieved reductions of greater than 60%).

In 2011, the US EPA issued new Mercury and Air Toxics Standards (MATS) to reduce the emissions of mercury and other toxins from coal- and oil- fired power plants by 90%. The Lake Champlain Basin Program (LCBP) has identified mercury and PCB management as a high priority. The LCBP has worked with state agencies and local universities to exchange and properly dispose of mercury-bearing products, including dairy manometers, maple syrup thermometers, dental amalgams, and household thermometers. In addition, municipal solid waste districts have collected more than 6,000 pounds of mercury-bearing products, eliminating more than 90 pounds of mercury from waste streams.



NOTE: The values are mean mercury concentrations, normalized to the average length of the fish. Bars show standard errors.
DATA SOURCE: Vermont Agency of Natural Resources; 2011 data from Biodiversity Research Institute.

Figure 1. Mercury levels in fish

How successful have reduction efforts been ?

In summer 2011, the Biodiversity Research Institute (BRI), under contract with the LCBP and in collaboration with Lake Champlain International (LCI), assessed concentrations of mercury and PCBs in fish tissue. BRI collected fish tissue samples during LCI's annual Father's Day Fishing Derby and compared toxin concentrations to levels in 2003 and 2004. BRI collected 292 non-lethal samples for mercury analysis from smallmouth bass, yellow perch, white perch, lake trout, northern pike, and walleye. Nearly half of the samples came from fish caught in the Main Lake during the Derby. Field crews collected another 150 samples from other areas of the Lake prior to the derby. Fifteen lake trout caught during the Derby were analyzed for PCBs.

Study results show substantial declines in mercury for lake trout and yellow perch, and both white perch and yellow perch are now well below the US EPA criterion of 0.3 parts per million (ppm) for mercury in fish tissue. Lake trout and walleye have moved closer to acceptable levels, and when compared to 1997 data, mercury levels in walleye have also improved.

The 2011 PCB analysis revealed a substantial decline in lake trout from levels found in historic data collected between 1987 and 2004, suggesting that the Cumberland Bay cleanup was largely successful.

With US EPA's new mercury standards for power plants, it is increasingly likely that all of these species will approach the EPA 0.3 ppm standard in five to ten years. This and future studies on mercury and PCB concentrations in Lake Champlain fish will inform and guide management decisions, including fish consumption advisories.

Mercury and PCBs pose the greatest threat to children and women of child bearing age.

Non-lethal sampling of fish.
Photo: BRI

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To read BRI's full report, please visit the LCBP's publications database at http://bit.ly/113q384