Is It Safe to Eat?
State-Wide Inter-Agency Research Collaboration Is All About Fish

By Mark Nimiroski
and Anna Meyer

Whenever Rhode Island’s Cub Scout Pack 10 goes fishing, the boys are eager to know if they can eat the fish they catch.

At the moment, the answer is “no,” because the Rhode Island Department of Health advises against consuming fish caught in Rhode Island’s lakes and streams unless the fish were raised in a hatchery before being used to stock a water body. The guidance is in place to protect the public from exposure to methylmercury, a potent neurotoxin.

But while the advisory is based on extensive research by EPA and others, it doesn’t account for the many environmental factors that affect whether methylmercury is present and the variability of those factors from lake to lake. These factors include the acidity of the surrounding water and levels of dissolved sulfate and dissolved organic carbon, according to a 2006 article in Environmental Science and Technology (cited in a 2008 report by the Northeast States for Coordinated Air Use Management).

That’s why there’s an ongoing effort to study the amount of methylmercury in fish in each of the 63 Rhode Island lakes and ponds with public access.

Mercury

Mercury, a toxic metal that is released to the environment through natural and human processes, has been a topic of concern for states and the EPA for decades. The vast majority of mercury in the waters of NEIWPCC’s seven member states can be attributed to atmospheric deposition: mercury that falls into surface waters or is carried to them from land by stormwater runoff after being emitted into the air from sources such as coal-fired power plants. Airborne mercury can travel far from its source, not only from within the region but from elsewhere in the United States and beyond.

Once in the water, mercury can be converted by bacteria to its most toxic form, methylmercury. Fish absorb methylmercury when they consume bacteria, plankton, and other fish. The chemical accumulates in the tissue of fish and other animals over time and it becomes more concentrated as it moves up the food chain.

EPA’s plan to regulate mercury at power plants has led to meaningful retirements of coal- and oil-fired generation despite a challenge to the rule in federal court. The agency developed its plan, known as the Mercury and Air Toxics Standards (MATS), in 2011 partially in response to requests from NEIWPCC’s member states and others. In 2010 EPA had convened a conference between NEIWPCC’s seven members and eleven other states from which mercury emissions travel to the waters of the Northeast. Representatives from EPA headquarters and EPA Regions 1, 2, 3, 4, and 5 also participated in the meeting.

The standards, which apply to all coal and oil power plants with a capacity of 25 megawatts or greater, respond to the problem that mercury and other toxics released from tall smokestacks can travel...
long distances via atmospheric currents, crossing state and even national boundaries.

The move followed 13 years of progressively stringent regional emission limits on local sources in the Northeast such as municipal and medical waste incinerators. However, there is still too much mercury entering water bodies, and fish mercury levels remain at unhealthy levels in many locations.

The latest installment in the legal battle over MATS came last December when the Court of Appeals for the District of Columbia Circuit allowed the rules to stay in effect while EPA finalizes an examination of costs to utility companies. The EPA’s cost review could be subject to further litigation.

**Rhode Island Research**

The Rhode Island mercury study, which is part of a comprehensive water monitoring program, is a collaboration of RIDOH, RIDEM, and EPA. Mark Nimiroski, a NEIWPCC staff member who provides technical support to RIDEM, is compiling the existing data on fish mercury levels for the public access lakes and ponds in the state. He’s also helping collect new data that will reduce the gaps in information on specific lakes.

On a picturesque October day in 2015, Nimiroski and other researchers collected fish from Tillinghurst Pond in West Greenwich, Rhode Island. The pond has a difficult access point that is not sufficiently developed for RIDEM’s boat. Thanks to technical assistance from EPA’s New England Regional Laboratory, the light craft pictured above was deployed along with an EPA operator.

The field team employed a technique known as electrofishing, in which electricity is used to stun fish so they can be netted easily. The team gathered fish from the bottom of the pond and from up and down the water column, in order to get a cross-section of the population. Fish on the bottom feed on organisms in and around the mud and sand. Other fish, including predator fish (which mostly eat smaller fish), live and feed higher in the water column.

The team tracked how many of each species and each size they collected. Following a standard method, some of the fish were sacrificed to collect tissue samples, but most were returned to the environment unharmed.

At day’s end, the team packed up some of the fish they’d caught and sent them to the EPA’s Atlantic Ecology Division Laboratory in Narragansett, Rhode Island. There, researchers determined the level of mercury in each fish and performed other tests to better understand the interactions of fish with the ecosystem.

The graph at left plots some of the results from a similar sampling effort in May, 2012, at Eisenhower Lake, also in West Greenwich. Each point represents one of the predatory fish collected from Eisenhower Lake. Each point’s horizontal position indicates the fish’s body length (in millimeters) and the vertical location shows the concentration of mercury in the fish (as measured in nanograms of mercury per gram of fish).

If a fish contains more than 300 nanograms of mercury per gram, EPA recommends that people limit their consumption of it. The graph illustrates that even the smallest predatory fish caught in this lake have elevated levels of mercury.

The upshot for recreational anglers of all ages is that the study is already yielding a plethora of information. The data are helping the agencies better understand the extent of mercury contamination in Rhode Island’s water bodies and could lead to size-specific fish-consumption advisories in the future.

Anna Meyer is an environmental analyst at NEIWPCC. Mark Nimiroski is a former NEIWPCC environmental analyst. He was stationed at the Office of Water Resources in Rhode Island’s Department of Environmental Management from 2011 to 2017.

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