Strategic Monitoring of Mercury in New York State Fish

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ABSTRACT

Large predatory fish are known to bioaccumulate mercury to high levels in certain waters. However, most waters have not been monitored to determine the concentrations in fish from these lakes. In a 4-year cooperative project funded by the New York State Energy Research and Development Authority and the New York State Department of Environmental Conservation 131 inland lakes, ponds and reservoirs from across the state were selected for an assessment of mercury in fish and surface water chemistry samples. Largemouth bass, smallmouth bass, walleye and yellow perch were identified as the target fish since these species are known to accumulate mercury, are popular sportfish, and are generally widespread in distribution. Data reported for the first two years of this study, which included 1758 fish samples from 94 waters, have resulted in 37 new fish consumption advisories from the New York State Department of Health. In 2005, obvious geographic patterns in fish mercury concentrations prompted a region-based consumption advisory for the Adirondack and Catskill parks. Preliminary trend analysis of our data showed that mercury concentrations in yellow perch have either decreased or remained the same when compared with fish monitored 10-17 years ago in a number of Adirondack lakes. Additional data analysis will include multivariate analysis to determine relationships among fish mercury concentrations, various water chemistry parameters, and watershed characteristics. Initial analyses indicate a significant relationship between methyl mercury levels in water and the color of the water. There is not as strong a relationship between water and fish mercury concentrations.

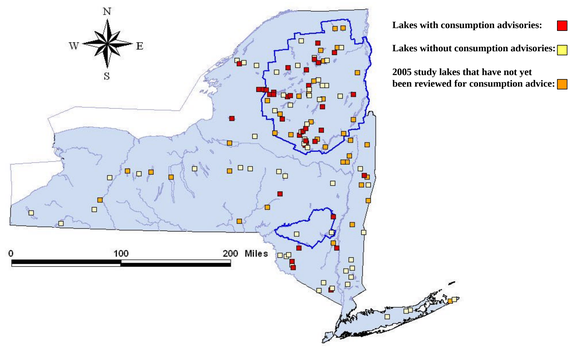
BACKGROUND and OBJECTIVES

- **Mercury is known to bioaccumulate in aquatic food chains, and this project will greatly add to our understanding of this toxic chemical in NYS.**
- **Large predatory fish accumulate the highest mercury concentrations, and we focused on walleye, largemouth bass, smallmouth bass and yellow perch.**
- **Fish consumption advisories are issued annually by NYS Dept. of Health, and we sampled many waters where no mercury data were available.**
- **Relationships between water chemistry and fish mercury concentrations have been documented, but more data and evaluation of NY's varied lakes and reservoirs are needed.**
- **Emissions and deposition of mercury have been reduced in recent years and resource managers hope to see declining mercury levels in the fish.**

METHODS

- **Over a 3 year period, 131 lakes were sampled across the state targeting walleye, bass and yellow perch. Fillets from individual fish were analyzed for total mercury.**
- **Water samples were collected in July from the study lakes and 24 chemical parameters measured to compare to the fish mercury concentrations.**
- **Data are being evaluated to determine relationships among water chemistry variables and fish mercury concentrations and also to determine statewide mercury variability and trends.**
- **Data from 2003 - 2004 were provided to NYS Department of Health to evaluate any need for fish consumption advisories for specific lakes.**

Location of Project Lakes 2003-2005



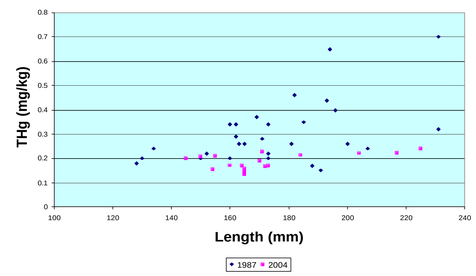
RESULTS

- **The study focused on waters where mercury was a potential problem; 40% of the 2003-04 study waters now have fish consumption advisories.**
- **Mercury concentrations in fish from the Adirondack and Catskill Mountain regions of NYS have higher mercury levels on average than from other regions of the state.**
- **Comparing our data with mercury data collected 15 years ago, we found that mercury concentrations in fish had decreased in some lakes and remained largely unchanged in others.**
- **Preliminary analysis of water chemistry – mercury relationships show that the color of the water is highly correlated with the amount of methyl mercury in the water.**

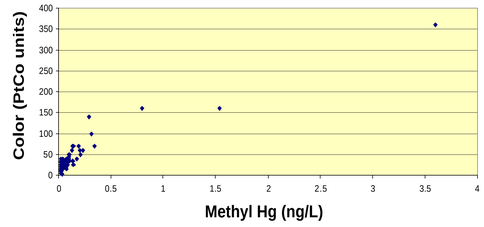
2003-04 Mercury Concentrations (ppm)

Species	n	Range	Mean
Walleye	161	0.11 to 3.60	0.66
Smallmouth Bass	359	0.04 to 3.32	0.62
Largemouth Bass	287	0.02 to 1.54	0.48
Yellow Perch	699	0.01 to 3.24	0.38

Kings Flow Hg Trends in Yellow Perch



Water Color vs Methyl Hg



TAKE HOME MESSAGE

- **Mercury continues to be present at high levels in large, predatory fish from certain waters, especially in the Adirondacks and Catskills.**
- **Considerable variability exists among fish species, and based on data from previous monitoring we know that bullhead, small and moderate size trout and sunfish usually have low mercury levels.**
- **Anglers should check the latest fish consumption advisories published yearly by the NYS Department of Health.**

ACKNOWLEDGMENTS

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-Staff from the Adirondack Lakes Survey Corp. collected fish and water samples from northern NYS under a separate NYSERDA contract and were invaluable in cooperative efforts ensuring smooth sampling operations.

-We also thank the DEC regional fisheries staffs for their assistance in collecting fish samples from a number of lakes.