Introduction
The Adirondack region of New York has been heavily impacted by acid deposition, however recent control in emissions of SO$_2$ and NO$_x$ have resulted in decreases in precipitation and surface water SO$_2^-$, and improvements in the acid-base status of some lakes. In addition, decreases in atmospheric Hg deposition have occurred largely due to controls on municipal waste incinerators and municipal waste combustors (Fig. 1). In 1992-1995 a survey of 25 lakes in the Adirondacks was conducted to examine patterns of water column and fish Hg concentrations (Fig. 2). This same set of 25 lakes were resurveyed in 2005-2006 to evaluate if changes in lake concentrations of Hg species or fish Hg have occurred in response to changes in atmospheric deposition of Hg and strong acids.

Methods
The 25 lakes within survey were selected to represent diverse watershed and geophysical characteristics that exhibit a range of lake and fish Hg concentrations. The yellow perch (Perca flavescens) was selected as an index species because it is widely distributed throughout lakes in the Northeast U.S. The survey was conducted in the late summer/early fall of 2005 and 2006.

Water Chemistry
Water samples were taken using US EPA clean techniques and measured for Hg, CH$_4$, and ancillary parameters.

Fish
Fish were captured using a variety of experimental gill nets and Alaska-style net traps. Length and weight measurements were obtained from each captured fish. Samples and operation hours were recorded for age and growth analysis. Six yellow perch (Perca flavescens) from each lake, representative of the age distribution, were selected for tissue sampling. Fish tissue plugs were analyzed in duplicate using a Milestone DMA analyzer.

Results – Water Chemistry
Changes in water chemistry parameters varied by the lake surveyed. However, in general the 25 lakes resurveyed in 2005-2006 showed higher values for DIC and DOC than those measured in 1992-1995 (Fig. 3). While both total Hg and methyl Hg levels have decreased in almost all of the lakes. The preliminary data suggests that lakes have responded to decreases in SO$_2$ and Hg emissions over the past decade.

Study Objectives
1. Evaluate changes in water column and fish Hg concentrations from 1992-2006.
2. Evaluate potential mechanisms contributing to observed changes from 1992-2006.
3. Compare water column and fish Hg concentrations across a gradient of lakes in the Adirondacks.

Results – Fish
Similar to changes in some chemistry parameters, levels of Hg in fish tissue varied by the lake surveyed. For example, in Rainbow Lake (Fig. 4) fish Hg decreased in all age classes from 1992-93 to 2005-06 while other lakes, such as Oregon Pond (Fig. 5), Hg declined in earlier age classes and increased in older age class. In general, preliminary data for heavily impacted mountain lakes, Hg concentrations show a significant decrease (p < 0.05) for 12 lakes, 6 lakes with increased fish Hg, and 7 lakes with no change in fish Hg (Fig. 6).

Summary
• The acid-base status of the 25 lakes resurveyed in this study appear to have improved over the past decade.
• The concentration of Hg in fish tissues has declined in 12 lakes since 1992-93. The degree of change in Hg in fish tissue is dependent upon the lake, which is likely due to specific geochemical characteristics.
• The average concentration of Hg in perch for the 25 lakes shows an increase in fish Hg with age for both the 1992-93 and 2005-06 survey, with Hg levels quickly exceeding the 0.3 \mu g g$^{-1}$ US EPA action limit by age two (Fig. 7).
• A better picture of the actual response of fish in the Adirondacks to declines in Hg and strong acid deposition will be gained by further investigation into the factors controlling the recovery of Hg contaminated fisheries.

Future Work
• From the results of the 25 lake survey, 6 lakes will be chosen for detailed field measurements.
• Using the data from these 6 lakes, the Mercury Cycling Model for Northeastern Drainage Lakes (MCM-NE) will be applied to better understand the response of fish Hg to changes in atmospheric Hg and acid deposition across the Adirondacks.

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For further information
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