TITLE: TRENDS IN SUMMER CHEMISTRY LINKED TO PRODUCTIVITY IN LAKES RECOVERING FROM ACID DEPOSITION IN THE ADIRONDACK REGION OF NEW YORK

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Abstract: The US Environmental Protection Agency established the Adirondack Effects Assessment Program (AEAP) to evaluate and monitor the status of biological communities in lakes in the Adirondack region of New York that have been adversely affected by acid deposition. This program includes chemical analysis of 30 lakes, sampled two to three times each summer. Results of trends analysis for lake chemistry and chlorophyll a (chlor a) are presented for 1994 to 2003, and a general comparison is made with recent results of the Adirondack Long-Term Monitoring (ALTM) Program, which included chemical analysis of all but two of these lakes (plus an additional 24 lakes) monthly, year-round for 1992-2004. Increases in pH were found in 25 of the 30 AEAP lakes ($P < 0.05$) and increases in acid-neutralizing capacity (ANC) were found in 12 of the 30 lakes ($P < 0.05$). Concentrations of both SO42- and Mg2+ decreased in 11 lakes ($P < 0.05$), whereas concentrations of NO3- decreased in 20 lakes ($P < 0.05$). Concentrations of NH4+ decreased in 10 lakes at a significance level of $P < 0.05$ and in three other lakes based on $P < 0.1$. Concentrations of inorganic and organic monomeric aluminum generally were below the reporting limit of 1.5 mu mol L-1, but decreases were detected in four and five lakes, respectively ($P < 0.1$). Concentrations of chlor a increased in seven lakes at a significance level of $P < 0.05$ and two lakes at a significance level of $P < 0.1$. A significant inverse correlation was also found between chlor a and NO3- concentrations in nine lakes at a significance level of $P < 0.05$ and two lakes at a significance level of $P < 0.1$. Results of AEAP analysis of lake chemistry were similar to those of the ALTM Program, although decreases in SO42- concentrations were more evident in the year-round ALTM record. Overall, the results suggest (a) a degree of chemical recovery from acidification during the summer, (b) an increase in phytoplankton productivity, and (c) a decreasing trend in NO3- concentrations resulting from the increased productivity.

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