



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2004ME27B

Title: Evaluating scope and trends for decreasing base cations (and increasing diluteness)

Project Type: Research

Focus Categories: Acid Deposition, Climatological Processes, Surface Water

Keywords: acid deposition, acid-neutralizing capacity, base cations, lakes, water chemistry

Start Date: 04/01/2004

End Date: 03/31/2006

Federal Funds: \$17,600

Non-Federal Matching Funds: \$39,766

Congressional District: 2

Principal Investigators:

Steve Kahl

Katherine Webster

Ivan Fernandez

Abstract

We will conduct the 20th anniversary re-sampling of a subset of the EPA Eastern Lake Survey (ELS) lakes, originally done in 1984. The lakes are the ELS-II statistical subset of 145 lakes. The rationale for this research is to evaluate the chemical responses and mechanisms that underlie the regional decline in surface water concentrations of base cations that has been widely reported from the entire northern hemisphere. Two of our objectives will augment the 2003 assessment of aquatic trends in surface waters relating to the Clean Air Act (Stoddard et al., 2003) by 1) enhancing the statistical coverage of the region using the ELS-II sub-population; and 2) expanding the range of the acid neutralizing capacity (ANC) in the target waters. The ANC of waters in the 2003 Stoddard et al report was generally less than 100 $\mu\text{eq/L}$; the ANC in ELS lakes ranged up to 400 $\mu\text{eq/L}$. Using the results from the proposed study, we will develop an empirical model for the rate of change in base cation (Bc) concentrations as a function of ANC (or base cations) as of 1986. We hypothesize that waters with higher ANC and base cations

are not experiencing a decline in base cations. The results of this study are important in expanding our understanding of recovery of surface waters from acidification. This proposal is a companion proposal to one already reviewed and funded by USDA. This proposal is simply requesting 50% of the funding for a graduate student who will make this project her thesis research, which was not possible to request from USDA due to funding limits.