The rate and extent of ecosystem recovery in the Northeast are directly related to the timing and degree of emissions reductions.

SUMMARY: According to the results of the computer model, the 1990 CAAA will have a positive effect on sulfate deposition but will not facilitate appreciable progress toward chemical recovery in Northeast watersheds similar to the HBEF.

DETAILS: With an additional 40 percent reduction in *electric utility emissions* of sulfur dioxide beyond the requirements of the 1990 CAAA, measurable chemical improvements occur. However, none of the five indicators reach the threshold needed to support complete biological recovery at the HBEF by 2050. An 80 percent reduction in *electric utility emissions* beyond the 1990 CAAA hastens and promotes more significant improvements in chemical conditions (see Table 2). For example, under this scenario streams in watersheds similar to the HBEF would change from acidic to non-acidic in roughly 20-25 years. By 2050, stream aluminum and the base cation content of the soil in these watersheds would begin to approach recovery thresholds or pre-industrial levels.

Chemical Indicator	Baseline Conditions			Emissions Scenarios		
	1850	Threshold	1970	2050 with 1990 CAAA	2050 with 40% deeper SO_2 utility cuts	2050 with 80% deeper SO_2 utility cuts
Sulfate wet deposition ($g/m^2 \bullet yr$)	0.23	–	1.69	0.89	0.69	0.50
Stream sulfate	9.6	–	62.0	34.3	28.9	23.5
Stream ANC (µeq/L)	42.7	>50	-5.4	-1.0	0.6	2.5
Stream pH	6.3	>6.0	4.8	5.3	5.5	5.7
Stream aluminum (µmol/L)	1.5	<2.0	12.1	6.4	5.6	4.3
Soil base saturation (%)	21.8	>20	13.4	12.3	13.3	14.4

TABLE 2: *Results from a computer model showing chemical conditions at the HBEF under three emissions scenarios.*

The model results further demonstrate that the process of recovery will be slow, particularly for sensitive systems such as the HBEF. To put these findings in perspective, approximately 6 percent of the lakes and streams in the Northeast (or 30 percent of those that are considered sensitive) are more vulnerable to acid deposition than the HBEF. This percentage is likely to be higher in areas that receive greater inputs of acid deposition and are less well buffered, such as the Adirondack Mountains of New York.

In Summary

Acid deposition is a pervasive problem that has had greater impacts on soils, surface waters, and trees than previously projected. Although the 1970 and 1990 Clean Air Acts have had positive effects, emissions remain high compared to background conditions. Given the accumulation of acids and loss of buffering capacity in the soil, many areas in the Northeast are now more sensitive to acid deposition and have developed an inertia that will delay recovery. Nevertheless, the computer model results presented here show that deeper emissions cuts will lead to greater and faster recovery from acid deposition in the northeastern United States.