

Data from intensive studies of 17 lakes in the Muskoka-Haliburton area of Ontario currently receiving about 20-30 kg/ha.yr sulphate in precipitation have shown that some lakes with summer alkalinity values up to about 40  $\mu\text{eq/L}$  experience pH depressions to values below 5.5 during snowmelt. One inlet stream was observed to have pH values as low as 4.1 during spring snowmelt. Other inlet streams had pH depressions but pH did not drop as low. Of 2,624 lakes surveyed in Ontario, 50% had alkalinity of less than 200  $\mu\text{eq/L}$ , a value that may be regarded as the upper limit for potential effects of acidic deposition; 13% of the lakes sampled in the province had alkalinities below 40  $\mu\text{eq/L}$ . While these lakes may be representative of the areas sampled, they may not be representative of lakes located elsewhere in the Shield. In another survey of 199 lakes of the Precambrian Shield of Quebec 7.5% had alkalinity of approximately 50  $\mu\text{eq/L}$  or less. There are about 1.5 million lakes on the Precambrian Shield in the provinces of Ontario and Quebec; but it is not possible at present to extrapolate results of the surveys to the total population of lakes.

Observed changes in aquatic life have both been correlated with measured changes in the pH of water and inferred by comparisons of waters of different pH values. Differences have been documented in species composition and dominance and size of plankton communities in lakes of varying pH. Study results show that the number of species is lower in low pH lakes compared to lakes of higher pH. These differences may have important implications for organisms higher in the food chain, but studies to date have not been done that might establish this connection.

Many species of frogs, toads and salamanders breed in temporary pools formed by the mixture of spring rains and snowmelt and subject to pH depression. Embryonic deformities and mortalities in the yellow spotted salamander, which breeds in temporary meltwater pools, have been observed in New York State where the acidity of the meltwater pools was 1.5 pH units lower than that of nearby permanent ponds. Population densities of the bullfrog and woodfrog were lower in acidic streams and ponds than in those of higher pH sampled in Ontario. These data are very limited and therefore the extent of the problem is unknown.

Atlantic salmon populations have disappeared from nine rivers in Nova Scotia but remain in rivers in the same area having higher pH due to greater alkalinity. Decreases in alkalinity and the pH of water over time have been observed in some low pH rivers in Nova Scotia. However, historical chemical data do not exist for the period of major decline in angling success nor do they exist for rivers in which fish declined.

Detailed studies of watersheds and clusters of lakes have been carried out in regions of North America and Scandinavia containing low alkalinity lakes and streams under a range of sulphate deposition