

the bullfrog and woodfrog were reduced in acidic streams and ponds in Ontario.

A lake acidification experiment in northwestern Ontario clearly shows that alterations to aquatic food chains begin at pH values slightly below 6.0. The remarkable agreement between these whole-lake experiments and observational studies in Scandinavia and eastern North America provides strong evidence that the observed declines in fisheries are caused by acidification and not by other ecological stresses.

#### Extent of Effects

The terrestrial mapping analysis for eastern Canada supported by surface water chemistry has demonstrated that the watersheds of sensitive (low alkalinity) aquatic ecosystems where effects have been observed have a low potential to reduce acidity and are representative, in terms of soil and geological characteristics, of much larger areas of eastern Canada.

Similarly, using related but different criteria, maps have been developed which characterize considerable areas of the northeastern United States as having low potential to reduce acidity. Therefore, there is reason to expect that there are sensitive surface waters in these other areas which would experience similar effects if subjected to deposition rates comparable to those in the study areas. However, quantification of the number of lakes and rivers susceptible to acidification in both countries will require validation of the terrestrial mapping methodologies and increased information on the chemistry of lakes and streams.

The present empirical evidence covers a broad spectrum of physical and climatological conditions across northeastern North America and therefore provides a reasonable basis on which to make judgements on potential loading effect relationships. However the data do have some deficiencies. More data on historical trends of deposition and associated chemical and biological characteristics would improve our understanding of long-term rates and effects of acidification. In addition, a better understanding of all the mechanisms involved in the acidification process will enhance our ability to estimate loading/response relationships precisely. Therefore any estimates of loading/response relationships should be strengthened in the light of new scientific information as it becomes available.

#### Target Loadings

Sulphate in precipitation has been used as a surrogate for total acid loading. Sulphate in precipitation can be reliably