

## **Impact of acid rain on aquatic wildlife and establishment of a biological monitoring operation focusing on lakes**

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Despite the fact that acid rain has lost some of its popularity, it still represents one of the greatest threats to the ecosystems of eastern Canada. Since 2001, the team of Stéphane Légaré, biologist with the Canada Wildlife Service (CWS), has been busy laying the foundations of a biological monitoring operation which seeks to determine the impacts of acid rain on aquatic wildlife.

The 33 lakes of Québec, which are the subject of the biological monitoring operation, are all located on the North Shore of the St. Lawrence River, between the Outaouais and Saguenay rivers. Lac des Enfers (788 m in altitude, pH of 6.76) of Parc national des Grands-Jardins was chosen for this study. For each lake, a complete sampling was done: benthos (organisms that live in mud), nekton (organisms that swim), zooplankton, amphibians, waterfowl and fish.

The potential effects of the acidification of aquatic environments on wildlife are numerous: increase in the availability of several contaminants, modification of the ionic balance of organisms, lower reproductive success for certain species, and decline in wildlife abundance and diversity. The data collected did not reveal a significant relationship between the pH of lakes and the abundance or diversity of zooplanktonic and nektonic invertebrates. These two groups of organisms seem instead to be affected by the presence or absence of fish. However, the analyses show that the diversity and number of invertebrates present in the benthos fall significantly when the acidity of the water increases. The benthic community thus appears to be a bio-indicator that is sensitive to the level of acidity of lakes.

In the case of vertebrates, no significant relationship was established between the diversity and abundance of amphibians and the acidity of lakes. However, the diversity of fish species turned out to be greater in lakes with a pH above 6. Although it is generally recognized that acidification affects waterfowl by modifying the abundance and the rate of contamination of their food (by mercury notably), the limited number of lakes sampled in the study did not make it possible to draw such conclusions.

The pH, when tied in with other chemical, physiological and ecological factors, is a key element for the dynamics of aquatic environments. By using larval organisms of the benthos (ephemera, dragonflies, amphipods) as potential bio-indicators of the level of acidity of the lakes of southern Québec, this monitoring operation, put in place by the Canada Wildlife Service, is an important step for measuring the long-term effects of acid rain on aquatic ecosystems as well as on their eventual recovery.