

## **STREAM CHEMISTRY AS AN INDEX OF SUSTAINABILITY IN THE COLLEGE BROOK WATERSHED**

*Principal Investigators: Dr. William McDowell, University of New Hampshire*

*Descriptors: water quality, land use, nutrients, sustainability*

### *Problem and Research Objectives:*

Stream chemistry reflects the physical, chemical, and biological characteristics of a watershed. It is responsive to degradation or restoration of the watershed's biotic functions; therefore the stream chemistry reflects the ecology of the watershed. College Brook runs through the heart of the University of New Hampshire campus and monitoring of stream chemistry will provide an excellent means to assess the sustainability of the campus.

Previous work on College Brook in 1991 showed that the University was having a significant impact on water quality and the stream biota, thus indicating that the campus could not be considered sustainable. The UNH incinerator was causing high organic matter loading, resulting in high biochemical oxygen demand (BOD) and low dissolved oxygen (DO) in the stream. Other practices, such as washing of waste art materials (slip, poster paint, etc.) into street drains near the Service Building, were also impacting College Brook.

With the closing of the UNH incinerator, and heightened awareness of College Brook on campus, water quality has likely improved. Sporadic tests of water quality and characterization of benthic invertebrates as part of class laboratory exercises suggested that it has. But there has been no attempt to systematically monitor water quality in College Brook, and this is what was needed to establish that ecological conditions in the watershed have improved.

### *Principal Findings and Significance:*

Analysis of the data from 2000 can be compared to the data from 1991 to establish if ecological restoration has occurred (sample analysis from 2000 is not complete at this time, with anions, cations, total dissolved nitrogen, and SiO<sub>2</sub> analysis still to be performed). The completed analysis indicates that the ecological integrity of the watershed has improved at sites that were sampled in both 1991 and 2000. Yearly averages show overall improvement of water quality from 1991 to 2000 (Table1). DO has increased and BOD has decreased at every site, indicating that the closing of the incinerator has decreased organic matter loading. DOC has also decreased at every site.

There has been an overall improvement of NH<sub>4</sub><sup>+</sup>, except at CB2 and CB4, where there have been increases. There has been an overall improvement in TSS as well, except at CB4, which has had a large increase. The increase in both of these parameters at CB4 may indicate that the placement of buildings over the stream has had a negative impact that needs to be considered.

Further analysis is needed to determine the sustainability of the UNH campus. Samples in 1991 were taken from February to September, while samples in 2000 were taken from May to December. While comparisons of samples between 1991 and 2000 taken at the same time of year show that there has been improvement in water quality, the picture is not as clear as the yearly averages indicate. There is much more variability in the data when the time of year is taken into account. A more complete

sampling period is needed to determine the precise amount of improvement at all sites within the watershed and sampling has continued in 2001 to establish the ecological health of College Brook.

[Visit the web site](#), which shows the progress of the restoration, a complete description of the project (with pictures of the sites), and completed data from the project.