



Effects of warming on benthic communities in a boreal lake: Implications of climate change

Baulch, H. M., D. W. Schindler, M. A. Turner, D. L. Findlay, M. J. Paterson, R. D. Vinebrooke

Limnol. Oceanogr., 50(5), 2005, 1377-1392 | DOI: 10.4319/lo.2005.50.5.1377

ABSTRACT: We experimentally warmed a series of shallow enclosures by 4.5° C and measured responses of the epilithon (biofilm on rocky surfaces) and invertebrates. Maximum rates of net photosynthesis increased by 28-115% and rates of dark respiration increased by 29-103% as a result of warming. Long-term analyses using data from unmanipulated Lake 239 corroborated these findings, showing that rates of light-saturated photosynthesis and dark respiration were positively correlated with water temperature. Warming effects differed between communities (on natural and tile substrates, as well as well-developed and early successional communities). Warming consistently led to increased bacterial cell densities, but increases in total algal biovolume and diatom biovolume were seen only in an early successional tile community. Effects on the composition of the invertebrate community (studied only on well-developed tile biofilms) were small. We observed warming-related increases in carbon accrual within one community, and late in the experiment observed a change in carbon : phosphorus ratios of another community, possibly indicative of a degradation of food quality. Our study suggests that climate warming effects on epilithic community composition are likely to be heterogeneous and difficult to predict; however, the agreement between long-term and experimental results suggests that increased temperatures will increase metabolic rates of the epilithon.

Article Links

[Download Full-text PDF](#)

[Return to Table of Contents](#)

Please Note

Articles in L&O appear in PDF format. Open access articles may be freely downloaded by anyone. Other articles are available for download to subscribers only, or may be purchased for \$10 per article. All L&O articles are moved into Open Access after three years.