



Multiscale spatial distribution of a littoral fish community in relation to environmental variables

Brind'Amour, Anik, Daniel Boisclair, Pierre Legendre, Daniel Borcard

Limnol. Oceanogr., 50(2), 2005, 465-479 | DOI: 10.4319/lo.2005.50.2.0465

ABSTRACT: Using a new statistical tool, Principal Coordinates of Neighbor Matrices, we decomposed the signals representing the variation of fish community composition, fish density, and biomass in the littoral zone of a lake to assess the relative contributions of a series of spatial scales to the overall signal. We also quantified the relationship between variations of fish community descriptors and environmental conditions at different spatial scales. The fish community exhibited scale-dependent variability that we grouped into four categories at spatial scales ranging from 2 km (very broad scale) to <100 m (fine scale). These scales were associated with specific environmental variables, suggesting the presence of scale-dependent ecological processes within the lake. Following the hierarchy theory, we propose that Lake Drouin was primarily structured by the fetch, a very broad scale physical process. Through energy inputs, fetch might have influenced the appearance of various physical structures (i.e., rocky substrates, woody debris, and macrophyte beds) at finer spatial scales (i.e., broad and meso). Functional groups of species were observed and classified according to the range of spatial scales to which they were associated. Cyprinids and small-sized species displayed a multiscale spatial distribution, whereas the distribution patterns of zoobenthivores were restricted to a single spatial scale. This study provides quantitative support to the idea that the littoral zone of lakes can be perceived as a hierarchical arrangement of habitats that differ not only by the environmental conditions among them but also by the spatial scales at which environmental conditions vary within them.

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.

