



Effects of water color on predation regimes and zooplankton assemblages in freshwater lakes

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ABSTRACT: Northern temperate lakes often have high water color because of high concentrations of dissolved organic carbon (DOC). Altered light, temperature, and oxygen profiles in these brown-water lakes should reduce the foraging abilities of planktivorous fish and reduce predation on zooplankton and invertebrate predators such as *Chaoborus*. Additionally, reduced diurnal vertical migration should limit exposure to cold temperatures and increase zooplankton growth rates. We hypothesized that, with increasing water color, *Chaoborus* would become more important, and this change would be followed by a shift in the zooplankton assemblage toward larger species. To test this hypothesis, we carried out a 2 x 2 x 2 factorial enclosure study to examine the effects of high and low color and the presence and absence of both fish and *Chaoborus* on zooplankton assemblages. We also analyzed the zooplankton community structure of two lakes with similar morphometry and fish composition but very different water color. Both studies showed that, in highly colored water, *Chaoborus* was more abundant and the zooplankton community shifted from small species, such as *Bosmina* and small copepods, to large species, such as *Daphnia* and *Holopedium*. Concurrently, the food web structure changed from top-down control to intraguild predation. Because not only the physical habitat differs between clear- and brown-water lakes, but also the predation regimes and food web structure, we conclude that brown-water lakes are a distinct lake type.

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