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Factors influencing zooplankton size structure at contrasting temperatures in coastal shallow lakes: Implications for effects of climate change

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ABSTRACT: We assessed the importance of temperature, salinity, and predation for the size structure of zooplankton and provided insight into the future ecological structure and function of shallow lakes in a warmer climate. Artificial plants were introduced in eight comparable coastal shallow brackish lakes located at two contrasting temperatures: cold-temperate and Mediterranean climate region. Zooplankton, fish, and macroinvertebrates were sampled within the plants and at open-water habitats. The fish communities of these brackish lakes were characterized by small-sized individuals, highly associated with submerged plants. Overall, higher densities of small planktivorous fish were recorded in the Mediterranean compared to the cold-temperate region, likely reflecting temperature-related differences as have been observed in freshwater lakes. Our results suggest that fish predation is the major control of zooplankton size structure in brackish lakes, since fish density was related to a decrease in mean body size and density of zooplankton and this was reflected in a unimodal shaped biomass-size spectrum with dominance of small sizes and low size diversity. Salinity might play a more indirect role by shaping zooplankton communities toward more salt-tolerant species. In a global-warming perspective, these results suggest that changes in the trophic structure of shallow lakes in temperate regions might be expected as a result of the warmer temperatures and the potentially associated increases in salinity. The decrease in the density of large-bodied zooplankton might reduce the grazing on phytoplankton and thus the chances of maintaining the clear water state in these ecosystems.

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