

A detailed insight into an Irish dystrophic lake, from physico-chemical to biological dynamics

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Dystrophic lakes, also called humic or brown lakes, have naturally low levels of inorganic nutrients and high concentrations of humic matter. This gives a typical brown colour to the water which increases attenuation of solar radiation and has been associated with a natural reduction in primary productivity. In contrast, this terrestrial carbon sources (humic compounds) tend to promote higher bacterial production, which in turn alters the energy and chemical flows through the aquatic food web. The role that changes in physico-chemical and biological dynamics have in determining plankton diversity, biomass and community structure in Lough Feeagh, an Irish dystrophic lake in the west of Ireland, was investigated over one year period (January 2018 – February 2019). Changes in phytoplankton community and nutrient elemental composition of zooplankton seston food supply was found to have a role in influencing zooplankton community structure. In addition, high zooplankton biomass during winter periods suggested that primary consumers also take advantage of allochthonous organic carbon during this time. A better understanding of zooplankton diet and its implications for aquatic food webs is particularly important in dystrophic lakes such as Feeagh, where primary consumers are highly adapted to high carbon to nutrient ratios and poor carbon quality and where increased ‘browning’ effects have been observed in temperate lakes across Europe owing to climatic changes.

Keywords: nutrient stoichiometry, food quality for primary consumers, allochthonous versus autochthonous organic matter contributions, planktonic communities, dystrophic lake, aquatic food web.