ICES/PICES 6ZPS 2016/ S5

Testing the “loophole hypothesis”: understanding the role of microzooplankton grazing in phytoplankton bloom dynamics.

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Microzooplankton herbivory constitutes a major source of mortality for phytoplankton in many marine ecosystems, and microzooplankton are themselves important prey for larger zooplankton. A series of 20 experiments were conducted over two years at an open shelf station (“E1”) in the Western English Channel to explore the relationship between microzooplankton grazing, prey cell size and growth rate. We used the dilution technique to investigate the seasonal changes in microzooplankton community grazing on major phytoplankton groups, determined using flow cytometry and FlowCAM. These experiments were coupled with mesozooplankton selective feeding experiments and the data used to determine grazing impact on primary production and top-down predation on microzooplankton. Our data demonstrate strong seasonality but this differed between years. A spring and autumn diatom bloom featured in 2014 compared to a major dinoflagellate bloom in 2015. Microzooplankton were the main consumers of autotrophs. Their grazing controlled autotrophic stocks outside of spring and autumn bloom periods. We test the “loophole hypothesis” that it is the larger diatom taxa that can escape microzooplankton grazing control, allowing them to form the blooms. The time-series of physical data, stoichiometry and grazing impact from the E1 site are discussed in relation to modelling approaches to understand bloom dynamics.

Keywords: microzooplankton, phytoplankton, growth, grazing

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