



Climatic influences on algal populations of boreal forest lakes in the Experimental Lakes Area

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ABSTRACT: We examined long-term phytoplankton data records for four oligotrophic boreal lakes situated in the Experimental Lakes Area (ELA), western Ontario, for responses to climatic change. ELA experienced a cyclical wet-dry-wet pattern from 1968 to 1998, with the early 1970s and 1990s having above-average precipitation and the 1980s being a period of drought with a 2° C increase in air temperature. During this drought, the length of ice-free season, duration of stratification, depth of the euphotic zone, and light extinction increased while precipitation and nutrient inputs to the lakes decreased. Phytoplankton assemblages of four study lakes were temporally coherent. During the drought, phytoplankton biomass and the number of phytoplankton species increased despite decreased nutrient inputs. There was a noticeable shift in species composition to greater abundances of dinoflagellates and large chrysophytes—mixotrophic species capable of cycling through the deeper, lower light, high-nutrient waters, presumably to consume bacteria as an alternative to autotrophic production. These species have slow turnover times; therefore, suspended nutrients were held in the water column for a longer period of time. Phytoplankton photosynthesis was less responsive.

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