

CLIMATIC CONTROLS ON DIATOM SUCCESSION AT ELK LAKE, MINNESOTA

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ABSTRACT

Sediment traps placed in the profundal region of Elk Lake, north central Minnesota during the 1979 spring and 1983-84 fall and spring seasons monitored seasonal diatom production for two climatically distinctive periods. The spring of 1979 was one of the coldest and wettest on record. Ice out at Elk Lake was 10 days later than average, and spring circulation was short. *Fragilaria crotonensis* dominated the late spring and early summer diatom production in association with *Synedra* and *Cyclotella* species because phosphorus supply rates were apparently low compared to silica. The winter of 1983-84 was drier than usual, and the early but cold spring of 1984 caused ice out at Elk Lake to be about 1 week earlier than normal. Spring storms promoted a long and full circulation that allowed *Stephanodiscus minutulus* to bloom, presumably in response to increased phosphorus loading related to deep and vigorous circulation. The two dominant diatoms in Elk Lake, *F. crotonensis* and *S. minutulus* reflect climatic patterns that control lake circulation. The climatically regulated occurrence of these diatoms is generally, but not specifically comparable to their distribution in lake surface sediments throughout Minnesota. A combination of regional and lake-specific studies on the controls of diatom succession and distribution provides climatic insights for interpreting paleolimnological records of diatoms.