

EFFECTS OF THERMAL EFFLUENTS FROM THE BERGUM POWER STATION ON THE ZOOPLANKTON IN LAKE BERGUM

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The aim of the investigations was to describe the effects on the population dynamics of the zooplankton (microcrustaceans and rotifers) in Lake Bergum. The discharges started in August 1974. Not much is known about the zooplankton populations in Lake Bergum before this date. Since 1968 the Tjeukemeer (one of the largest Friesian lakes) is intensively studied by the members of the Limnological Institute. Whereas the zooplankton communities of the different Friesian lakes are very similar (BEATTIE *et al.*, 1978), it was feasible to compare the zooplankton population dynamics of Lake Bergum and Tjeukemeer.

During 1975, 1976 and 1977 an extensive sampling program was carried out in Lake Bergum. Samples were taken weekly during the growing season and fortnightly from October until April. Additionally, fortnightly sampling was carried out in 1978. The samples were collected at 8 different points in the lake, enabling comparison between various locations near the outlet and locations which were not heated at all.

Effects on the population dynamics.

Comparison of zooplankton numbers in the Tjeukemeer and Lake Bergum in 1975, 1976 and 1977 learned that there was no difference in the species composition, the periods of increase, and the moment of maximum abundance. Differences in the relative abundance and the period of decrease were probably caused by other factors than thermal discharges. The zooplankton density throughout the year was about the same for all sampling points within Lake Bergum. The periods of increase and decrease were exactly the same.

Entrainment effects.

Near the outlet the zooplankton densities at the surface water layer decreased 20 to 30% in numbers. The cladocerans *Bosmina longirostris*, *B. coregoni*, *Chydorus sphaericus* and *Daphnia* sp. and the copepodites of the cyclopoids (mainly *Acanthocyclops robustus*) showed higher densities in deeper water near the outlet. At 1.5 to 2.0 km from the outlet we found 'normal' densities at the surface and no concentration in deeper water. A vital staining technique was used to investigate the entrainment mortality of the cladocerans. The average increase in mortality during 3.5 hrs incubation at outlet temperature ranged between 2 and 3%. The entrainment mortality of *Leptodore kindtii* and the naupliar larvae of the cyclopoids could not be investigated by this technique. For these organisms we compared densities on different depths. Average percentual mortalities ranged from 19 to 33% for *L. kindtii* and from 25 to 28% for the naupliar larvae of the cyclopoids. The effect of this mortality on the population dynamics of the zooplankton in Lake Bergum could not be determined because of a constant water flow from the power station to other water bodies.

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References

BEATTIE, D.M., H.L. GOLTERMAN and J. VIJVERBERG, 1978. An introduction to the limnology of the Friesian Lakes. *Hydrobiologia*, 58:49-64.