ZOOPLANKTON ECOLOGY OF A GREAT PLAINS RESERVOIR

by 6408

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B. S., Colorado State University, 1969

A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Division of Biology

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1971

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INTRODUCTION

Zooplankton inhabit a wide variety of aquatic environments (Hutchinson, 1967). The taxonomic composition of a zooplankton community and the numerical density of each species are affected by environmental conditions. Most investigators agree that temperature, food supply, and predation, acting separately or together, regulate the composition and density of the majority of zooplankton populations (Borecky, 1956; Edmondson, 1965; Frank, Bo11, and Kelley, 1957; Galbraith, 1967; Hall, 1964; Hazelwood and Parker, 1961; and others). The chemical properties of the water may be important in some cases (Hazelwood and Parker, 1962; Hutchinson, 1967). Rapid flushing time depletes zooplankton populations in some lakes (Brook and Woodward, 1956; Cowell, 1967).

Temperature usually affects the reproductive rate and the individual growth characteristics of zooplankton (Coker, 1933; Hall, 1964). For a given species an optimum temperature exists at which the species is most successful, other factors remaining constant. On either side of this optimum is a range of temperatures at which the organism can survive but is less successful than at the optimum.

Food also affects the reproduction and growth of zooplankton. Lower food supplies cause decreased reproduction (Hall, 1964), slower individual growth (Richman, 1958), and in extreme cases starvation (Hutchinson, 1967). The food of herbivorous zooplankton includes algae, bacteria, and detritus. Algae is

considered to be the most important source of food in most lakes, but detritus can be a major food source in the absence of algae (Saunders, 1969). The value of bacteria as an energy source has not been adequately established. Carnivorous zooplankton depend mainly on other zooplankton or protozoans for food, often being quite selective in their diet (Fryer, 1957).

Among the major predators of zooplankton are fish and, as stated above, other zooplankton. In addition to lowering the density, predation may also change the species composition of the zooplankton community (Brooks and Dodson, 1965; Cramer and Marzolf, 1970; Galbraith, 1967; Reif and Tappa, 1966). Cyclopoid copepods are at times predacious on other zooplankton and often cannibalistic, preying on their own species (Fryer, 1957).

In most freshwater environments water chemistry has little direct effect on zooplankton (Hutchinson, 1967). Dissolved oxygen can be limiting in very low concentrations. Correlations between populations and other elements have been shown, but no direct cause and effect was evident (Hazelwood and Parker, 1962).

The effect of rapid flushing time is merely depletion of the populations by loss through the lake outlet. Cowell (1967) found it to be a very effective depletion mechanism in Lewis and Clark Lake, South Dakota. Hall (1964) reported little loss of zooplankton to the outlet of Base Line Lake, Michigan even though the flushing rate was 12 percent of the lake volume per day during portions of the year.

Great Plains Reservoirs are relatively new environments from