

SPATIAL DELINEATION OF BIOTIC AND ABIOTIC GRADIENTS IN A RURAL NEW YORK RESERVOIR

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Abstract: The spatial changes in abiotic and biotic variables from riverine to lacustrine areas characterized by the river-lake concept of reservoir function was applied to the Tomhannock Reservoir, Rensselaer County, New York. To identify these longitudinal gradients, a two-year investigation (May 1991 to October 1992) was conducted to measure primary productivity, nutrient concentrations, chlorophyll α and phytoplankton biomass at three locations in the 705-ha water supply reservoir. Emphasis was placed on the measurement of primary production using the carbon-14 artificial incubator (photosynthetron) technique. The average annual production in 1992 was $247.3 \text{ gm}^{-2}245 \text{ d}^{-1}$, ranging from 52 to 2677 mg C m^{-2} . Mean α^B (assimilation efficiency), P^B_m (assimilation number), and I_k (saturation irradiance) were $4.40 \text{ mg C mgChl}^{-1} \text{ E}^{-1} \text{ m}^{-2}$, $3.82 \text{ mg C mgChl}^{-1} \text{ h}^{-1}$, and $236.5 \text{ } \mu\text{E m}^{-2} \text{ s}^{-1}$, respectively. Neither seasonal nor spatial variability of these photosynthetic parameters were observed. Except for Secchi depth, distinct longitudinal zones from river inflow to darn were not statistically demonstrated in the Tomhannock Reservoir. Mean extinction coefficient, chlorophyll α and total phosphorus concentrations decreased; Secchi transparency and phytoplankton biomass increased; while primary productivity and dissolved inorganic nitrogen concentration remained the same from headwater to darn. These baseline data will be used to assess the future effectiveness of best management practices (BMPs) recently instituted on selected watershed farmland in an attempt to reduce the detrimental impact of agricultural activities on drinking water quality.

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