Macrobenthos of the Tidal Delaware River Between Trenton and Burlington, New Jersey

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ABSTRACT: A study of the macrobenthos of the tidal Delaware River between Burlington and Trenton, New Jersey, included measurements of density and biomass for common species. Tubificidae (*Limnodrilus*) were dominant, comprising over 90% of all organisms taken in the 3-year study period. Density seemed to be a function of water temperature (20-25 C, optimal) and was greatest in late spring and early summer. Other common species were larval *Procladius culiciformis* (Chironomidae) and *Corbicula manilensis* (asiatic clam). *Procladius* was most abundant in late summer just prior to and during emergence. The asiatic clam was in the process of colonizing the area and growth data have been calculated. Potential relationships between numbers and standing crop of the common organisms with sediment type, and seasonal changes were explored.

Introduction
The Delaware River between Trenton and Burlington, New Jersey, is a freshwater tidal river. The width of the river ranges from 275 to 450 m along the 21 km stretch studied. The dredged commercial shipping channel is 6-12 m deep and 120 m wide. Tidal amplitude is 1.8 to 2.1 m. Mean flow of the river just above the fall line at Trenton is 327 m³/sec. Average tidal flow at Burlington is 1,120 m³/sec. Industries along the New Jersey and Pennsylvania shorelines include petroleum storage companies, a large United States Steel smelting facility, and many chemical and light industrial facilities. Area residents use the river for boating, fishing, hunting, and occasional swimming. Municipal use includes both domestic water supply and sewage disposal.

The benthic macrofauna was studied from August 1970 to October 1973 as part of a comprehensive ecological research project conducted by Ichthyological Associates for Public Service Electric and Gas. Objectives were to describe the spatial and temporal components of the benthic communities. The discovery of the asiatic clam, *Corbicula manilensis*, in 1971 afforded an opportunity to study the spread of this biological pest. Only one previous study of the benthos of the Delaware River in the Philadelphia to Trenton area has been reported (Fuller and Powell 1973).

Methods
Samples were taken over a distance of 21 km in the river between Trenton and Burlington, New Jersey (Fig. 1). Six randomly selected sites in the vicinity of Newbold Island were sampled three times each in August 1970. Six perpendicular transects from Trenton to Florence, New Jersey, were established in June 1971. Along these transects samples of bottom sediments were taken at mid-river in the shipping channel, and in shallow water near both shores. Only two abundant species were found, so the sampling scheme was revised in August 1971 to include four randomly sampled zones which are designated the Mercer, Newbold, Florence, and Burlington areas (Fig. 1). This sampling technique provides a

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Fig. 1. Map of the tidal Delaware River between Trenton and Burlington, New Jersey, showing location of benthos sampling areas.

statistical base for the approximation of density and standing crop. Eight to twelve samples a month were taken in the Mercer, Florence, and Burlington zones. Sixteen to 60 samples a month were taken in the Newbold zone. Sampling was performed every month at each zone, weather permitting, August 1971 through October 1973. Individual collection sites were randomly chosen using coordinate axis in a grid location system (Fig. 1).

Samples were taken with a Ponar grab (0.23 x 0.23 m) or a Petersen (0.30 x 0.30 m) grab. Samples were washed through both No. 18 (1.0 x 1.0 mm) and No. 35 (0.5 x 0.5 mm) standard testing sieves. Sediments were not preserved before washing and sorting (up to 24 hr. after collection). This was necessary due to the large number of samples processed each week. When it was apparent this delay was unavoidable (early 1971), several samples were divided into three fractions before washing and processed separately; fraction 1 was preserved immediately after collection with 5-10% formalin, fraction 2 was preserved after being washed in the sieves and then preserved in 5-10% formalin (up to a 4 hr. delay between collection and preservation), and fraction 3 was processed without preservation (up to a 24-hr. delay). Of the three fractions 3 was nearly always more diverse and contained more individual organisms of every dominant species. Additional samples were divided into two fractions, one analyzed live within 1 hr. and the other analyzed within 24 hr. The samples in the first fraction were nearly identical to those in the second fraction. On the basis of these sample tests run in midsummer, it seemed appropriate to allow unwashed samples to sit for up to 24 hr. rather than preserve them. Sieve residues were examined in white enamel pans and the live organisms were identified and counted. Common species were dried 24 hr. at 95°C in an oven and 24 hr. in