Tidal Freshwater Ecosystems
A Symposium Held at the Virginia Academy of Science Annual Meeting

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George Mason University
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Tidal freshwater ecosystems occur in virtually all of the drowned river valley estuary systems of the east coast of North America. Both morphometric and hydrologic factors are important in establishment of a tidal freshwater zone at the head of an estuary. Freshwater inflow must be sufficient to displace all brackish water from the area. Furthermore, the basin must be restricted enough to allow accumulation of the incoming freshwater to occur without immediate mixing with the brackish estuarine water. These conditions are met in many of the larger rivers draining the mid-Atlantic states including the Delaware, the Hudson, and Chesapeake Bay subestuaries such as the James and the Potomac. The Potomac has a zone of tidal freshwater stretching about 60 km from Chain Bridge to near Quantico which contains some 200-800 million cubic meters of water (Lippson et al. 1979. Environmental Atlas of the Potomac River Estuary. Johns Hopkins University Press). The range in volumes results from the seasonal variation in freshwater inflow resulting in a boundary with brackish water which varies seasonally.

The tidal freshwater zone shares many hydrologic characteristics with the estuary proper, but the biological and chemical characteristics are essentially those of an inland freshwater ecosystem. The tidal freshwater zone has been likened to a lake or reservoir in which the water sloshes back and forth with the tides (Jones et al., this volume). The fauna and flora of the tidal freshwater region bears much more resemblance to a nearby lake than the adjacent estuarine ecosystem. The exceptions to this rule are the nektonic organisms such as fish and crabs which may move into the tidal freshwater zone on a seasonal basis.

Given the tendency of large human communities to be established near the head of tide in large rivers it is understandable that tidal freshwater regions have been subjected to large volumes of treated and untreated waste. Wastewater treatment plant discharges into the tidal freshwater portion of the Potomac River constitute over 450 million gallons per day, a substantial portion of the total freshwater inflow. Historically, this proximity to large sources of municipal and industrial wastes has had severe impacts on tidal freshwater ecosystems. The tidal freshwater Potomac River was subjected to repeated algal blooms for many years attributable to discharge of domestic waste. The Kepone contamination of the James river originated from and heavily impacted the tidal freshwater zone of the James River. Clearly, freshwater ecosystems occur at a major locus of potential anthropogenic impact.

This symposium was organized to bring together individuals working on a variety of different organisms and in several different tidal freshwater systems. The idea was to promote communication among workers engaged in the same types of studies on geographically different tidal freshwater systems and also among workers engaged in different types of biota within the same system. Eighteen papers were presented by scientists from sixteen institutions located in four states. Studies encompassed aquatic macrophyte, phytoplankton, zooplankton, benthic invertebrate, and fish communities. Abstracts from all presentations were published in the Summer 1990 issue of the Virginia Journal of Science (Vol. 41, No. 2, pp. 85-89). Participants were invited to submit papers for a symposium proceedings. Following review, three papers resulting from the symposium were submitted for publication in the proceedings of the symposium. R. Christian Jones served as editor for all papers except that of Jones, Buchanan, and Andrele which was refereed by Donald P. Kelso.

These symposium proceedings are dedicated to the memory of Dr. William E. Odum, a pioneer in the study of tidal freshwater ecosystems.