



Concepts in Delaware Estuary Science and Management

*A Web-Publication of the
Partnership for the Delaware Estuary
A National Estuary Program*
www.DelawareEstuary.org

Contribution No. 05-01

Signature Ecological Traits of the Delaware Estuary: Tidal Freshwater Wetlands

About this Series. This is one in a series of short articles contributed to the Partnership for the Delaware Estuary (PDE) by scientists and managers living and working in the region. The purpose of web-publishing these articles is to provide introductory, “leading” information about natural resources, scientific concepts, management issues, and other science activities of current and emerging interest, for which little documented information exists elsewhere. In many cases, articles web-published to this forum will lead to more in-depth scientific publications or studies.

Please send suggestions and contributions to the Delaware Estuary Science Coordinator at the Partnership. The Partnership reserves the right to reject any contribution.

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Suggested Method for Referencing this Document:

Kreeger, D. 2005. Signature ecological traits of the Delaware Estuary: tidal freshwater wetlands. Concepts in Delaware Estuary Science and Management, No. 05-01.

Partnership for the Delaware Estuary.

<http://www.delawareestuary.org/scienceandresearch>.

Signature Ecological Traits of the Delaware Estuary: Tidal Freshwater Wetlands

Danielle Kreeger, Partnership for the Delaware Estuary; DRBC; P.O. Box 7360; 25 State Police Drive; West Trenton, NJ 08628. DKreeger@DelawareEstuary.org

April 24, 2005

Natural wetlands are crucial boundaries between land and open water systems that provide important ecological and economic services, including the provision of habitat and food for plants and animals, remediation of many pollutants, and the maintenance of water quality. They also represent a “first line of defense” for floods and storm surges. Yet, in the past 100 years losses of wetland acreage in the U.S. have been terrific, and even today this trend continues despite vigorous efforts to restrict further losses.

Wetland losses have been especially problematic in coastal and estuarine systems. Here, tidal marshes are being increasingly eroded by sea level rise, and their landward retreat is often restricted by development of one form or another. Alteration of freshwater inflow and sediment budgets is also a concern in many areas where accretion of the marsh surface depends on upstream inputs. In comparison to other large-bodied mid-Atlantic estuaries such as Chesapeake Bay, the Delaware Estuary is rich in tidal wetlands which form a nearly contiguous band around its periphery. Because of the sheer extent of our wetlands and the very active hydrodynamic flushing with the tides, we believe that these marshes probably play a greater role in the biogeochemistry, water quality and ecology of the system compared to other large American estuaries. Indeed, it is possible that the tidal marshes are a fundamental, life-sustaining feature of the Delaware Estuary, which drains a watershed containing 9 million people, one of the world's great concentrations of industry, and one of the top commercial ports in the United States.

Of special concern are the tidal freshwater wetlands (TFW's) in the upper portion of the Delaware Estuary. The tidal freshwater portion extends from near Trenton, NJ, to near Chester, PA, and this represents one of the larger tidal freshwater estuaries in the world. Historically a vast portion of the shores along this stretch were covered with TFW's, including most of South Philadelphia and the Philadelphia Airport complex. Today, perhaps less than 5% of pre-settlement TFW acreage remains, and only vestigial marshes remain on the PA side of the river; in Bucks County (e.g., Bristol marsh) and Delaware County (e.g., Heinz and Tinicum marshes).



Despite their small size compared to historical conditions, these TFW's still provide significant benefits to the ecosystem and populace. They are geographically situated in an urban landscape at the nexus between the terrestrial ecosystem, the river and tributaries flowing downstream, and Delaware Bay to the south. Acre for acre, these marshes may provide greater ecosystem and socioeconomic services than brackish and salt marshes characteristic of the lower Estuary, particularly because of their urban

backdrop and proximity to heavy industry. They provide numerous hidden ecosystem services by “filtering” surface and groundwater runoff, detoxifying some classes of pollutants, removing excess nutrients, and trapping sediment. They are certain to provide habitat for important plants and animals native to the Estuary, such as wild rice (*Zizania aquatica*) and sturgeon (*Acipenser brevirostrum*). They also provide important recreational outlets for people.

Unfortunately, we have a poor understanding of the ecology of the tidal freshwater portion of the Delaware Estuary, including the extent and importance of TFW's. Long regarded as an industrial river, the Delaware has received greatest environmental attention in the flowing freshwater (above Trenton) and Delaware Bay (below the C & D Canal) portions of the system.



On a National level, created and restored wetlands are increasingly being used to offset or mitigate for losses of wetland acreage or other activities. The Delaware Estuary is no exception to this trend, being home to some of the most extensive wetland restorations in the country over the past decade. Estuary-wide, there remains a significant imbalance however, with probably more than 99% of wetland restoration and enhancement activities being undertaken in the middle and the lower portions. One reason for this imbalance is the obvious difficulty in obtaining land and funding to conserve, restore and create TFW's in the most developed, industrial center of the system. A second reason is the recalcitrant notion that TFW's of the Delaware Estuary are industrial wastelands. But nevertheless, a significant opportunity exists to expand our respect for TFW's as one of the characteristics that sets the Delaware Estuary apart from its neighboring systems, and to continue to search for ways to conserve, enhance and restore these ecologically significant, imperiled habitats.