

Climate Change and The Hudson River Estuary: Decadal Trends in Precipitation, Discharge, and Water and Air Temperature

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Because the relative influence of riverine and marine endmembers varies continuously within estuaries, different locations may show distinct, or even contrasting, responses to changing climate. The tidal Hudson River estuary (HRE) ranges from fresh to polyhaline along its ca. 240 km length. Seekell and Pace (2011) described a decadal-scale warming trend in the HRE based on observations near Poughkeepsie, NY, near the geographic center of the estuary in the tidal, freshwater section. This study expands on the earlier analyses, examining ca. 70-year data records from three HRE locations representing the head (Albany, NY), midpoint (Poughkeepsie, NY) and mouth (New York City) of the tidal estuary. At each location, monthly trends were determined for air and water temperatures, and precipitation. In addition, trends in freshwater discharge into the upper estuary, and salinity in the lower estuary, were compared. Air temperatures have generally increased at all three locations since the mid-1940s, especially in summer months, with strongest trends in monthly mean minimum temperatures. In the upper and middle portions of the estuary, water temperature trends are similar to each other and follow air temperature trends in warmer months. Warming trends appear to be intensifying through time. At the marine end of the HRE, surface water temperatures have also increased, while bottom water temperatures have trended lower in summer months. The divergent temperature trends with depth in the lower estuary can be interpreted in the context of precipitation and freshwater discharge trends balancing seawater intrusion.