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## Particle Association of Enterococcus and Total Bacteria in the Lower Hudson River Estuary, USA

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### ABSTRACT

Bacterial particle association has important consequences for water-quality monitoring and modeling. Particle association can change vertical and horizontal transport of bacterial cells, as well as patterns of persistence and production. In this study, the abundance and particle association of total bacteria and the fecal-indicator, *Enterococcus*, were quantified between June and October 2008 in the lower Hudson River Estuary (HRE). Twelve sites were sampled, including mid-channel, near shore, and tributary habitats, plus a sewage outfall. Total bacterial cell counts averaged  $9.2 \times 10^9 \pm 6.4 \times 10^9$  cell  $l^{-1}$  (1 standard deviation), comparable to previous sampling in the HRE. Unlike earlier studies, bacterial abundance did not change consistently along the north/south estuarine salinity gradient. *Enterococcus* concentrations were highly variable, but mid-channel stations had significantly lower values than other habitat categories. Counts of total bacteria and *Enterococcus* were both correlated with turbidity, which was also significantly lower at mid-channel stations. A larger fraction of Enterococci were associated with particles ( $52.9 \pm 20.9\%$ , 1 standard deviation) than in the pool of total bacteria ( $23.8 \pm 15.0\%$ ). This high frequency of particle association, relative to total bacteria, could cause *Enterococcus* to be preferentially retained near input sources because of enhanced deposition to bottom sediments, where they would be available for later resuspension. In turn, retention and resuspension in nearshore environments may explain the observed cross-channel variability of turbidity and *Enterococcus*. Assessments and predictive models of estuarine water quality may be improved by incorporating cross-channel variability and the effects of particle association on key indicators.

### KEYWORDS

Attachment, Fecal Indicator Bacteria, Sedimentation, Sinking Rate, Sewage

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