

Nutrient Loading and Estuarine Bacterioplankton Communities

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11:00-12:00, Thursday, June 19

SSMC4, room 13153

Monie Bay is a tidally influenced sub-estuary of the Chesapeake Bay consisting of an open bay and three tidal creeks of varying agricultural land-use and salinities, representing an ideal natural experiment to evaluate the effect of nutrient loading on estuarine bacterioplankton communities. We investigated the effect of system-level nutrient enrichment with monthly measurements of bacterial abundance, production, growth efficiency, and single-cell activity within and among the open bay and tidal creeks. Spatial and temporal patterns in nutrient concentrations were linked directly to agricultural practices within each of the watersheds. Bacterioplankton responded positively to patterns of nutrient enrichment, as evidenced by consistently elevated bacterial production, growth efficiencies, and proportion of metabolically active cells in the more saline agriculturally-impacted creek. However, despite elevated nutrient concentrations, bacterial production and growth efficiency remained low in the freshwater-dominated creek, suggesting that salinity or substrate quality mediates the effect of nutrient enrichment. The relationship between bacterial production and chlorophyll-a in these creeks reveals that bacteria respond directly to nutrient enrichment under certain conditions. We conclude that variability in bacterial metabolism in this system is driven primarily by nutrient loading and that bacterioplankton communities serve as an integrative index of the ecological impact of system-level nutrient enrichment.