

Application of the Water Quality Analysis Simulation Program (WASP) to Evaluate Dissolved Nitrogen Concentrations in the Altamaha River Estuary, Ga

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The Water Quality Analysis Simulation Program (WASP v.7.4) and a water flow model, SqueezeBox, were used to model concentrations of dissolved nitrogen (DN) in the Altamaha River estuary, Georgia. Model development was guided by previous studies using WASP, literature surveys, and sensitivity analyses. The model was calibrated and validated against observations from the Georgia Coastal Ecosystems Long Term Ecological Research project. Average error between model predicted and observed concentrations was 39.8 % for NH₃, 23.6 % for NO₃⁻, and 7.8 % for DON.

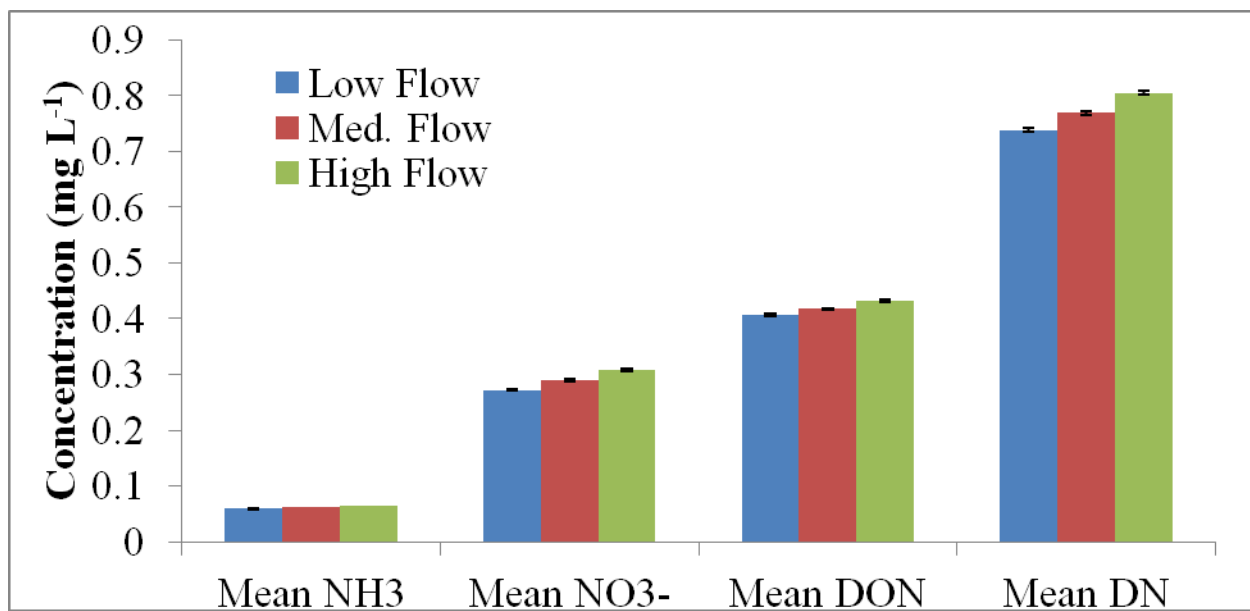


Figure: Predicted concentrations of dissolved nitrogen in the Altamaha River estuary under different river flow scenarios. (NH₃ = ammonia, NO₃⁻ = Nitrate, DON = dissolved organic nitrogen, DN = dissolved nitrogen, which is the sum of the other constituents)

Development of this tool allowed nitrogen concentrations in the Altamaha River estuary to be modeled under different flow and input scenarios. Results from the calibrated model showed that dissolved nitrogen concentrations in the estuary was positively correlated to both flow and the amount of dissolved nitrogen input to the estuary, and negatively correlated to temperature, with riverine DN input having an approximately 6-fold greater influence on predicted DN in the estuary than the other two factors. Overall, predicted DN concentrations were highest for high DN input, high flows, and low and medium temperatures.