



## *Patuxent Science Meeting 2004 Poster Abstract*

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### **Effects of nutrient enrichment on estuaries at Acadia National Park: current status and future projections**

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Protecting estuaries from nutrient over-enrichment requires site-specific information on nutrient sources and loads, projected future loadings, and ecosystem response. We used in situ mesocosms to quantify autotrophic responses to a range of nutrient loads in a small, micro-tidal estuary dominated by *Ruppia maritima* on Mt. Desert Island, Maine. Three treatment doses of combined inorganic nitrogen and phosphorus were applied as slow-release fertilizer during each of two ten-week experiments. Nitrogen additions spanned the range of loadings to northeastern estuaries (0 – 34 mmol DIN m<sup>-2</sup> estuary d<sup>-1</sup>). Critical thresholds causing significant increases in suspended chlorophyll concentrations and epiphyte loads were below 8 mmol DIN m<sup>-2</sup> d<sup>-1</sup>. *Ruppia* biomass decreased at relatively low nitrogen loading (2 mmol DIN m<sup>-2</sup> d<sup>-1</sup>), and showed increased sensitivity to enrichment at higher growing season temperatures. We estimated nitrogen loads to the estuary through continuous streamflow and monthly water-quality measurements in major tributaries over 18 months and evaluations of atmospheric and groundwater contributions. Published nitrogen export coefficients were calibrated based on measured nitrogen yields and land-use patterns, and future nitrogen loads were projected for a range of build-out scenarios. We have combined land use, nutrient load, and ecosystem response thresholds in a GIS-based decision support system that can be used by resource managers and town planners to inform surrounding land-use decisions.