

EFFECTS OF MODIFIED NUTRIENT CONDITIONS ON PHYTOPLANKTON IN THE NEUSE RIVER ESTUARY-PAMLICO SOUND

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Neuse River Estuary (NRE) - Pamlico Sound (PS) Bioassay Objectives

- Determine the growth limiting nutrient(s) of phytoplankton primary productivity
- Compare nutrient-phytoplankton relationships in NRE and PS
- Evaluate the effects of varied nutrient regime on phytoplankton community structure (community composition) and function (primary productivity)

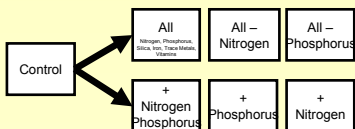
Phytoplankton Nutrient Bioassays: Strengths and Weaknesses



a direct measurement of the response of the native phytoplankton community to changes in nutrient

a variety of problems related to containment and removal from the natural physical, chemical and biological

Experimental Design



Measured Parameters

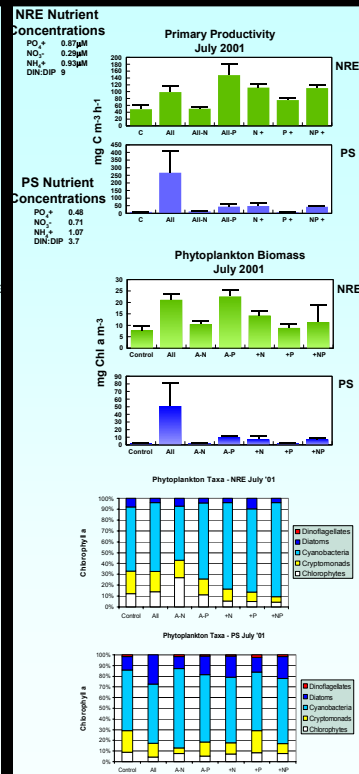
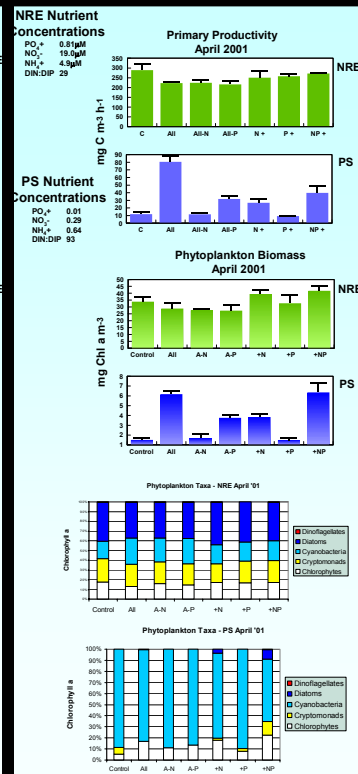
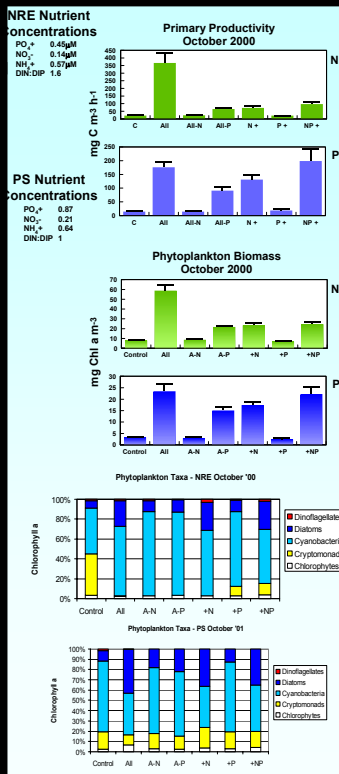
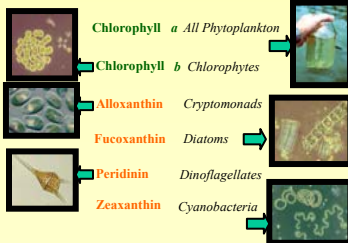
primary productivity, chlorophyll a, dissolved inorganic nutrients, HPLC diagnostic photopigments, phytoplankton taxonomy

Bioassay Results

- Experiments were conducted in Fall, Spring and Summer
- Chlorophyll a concentrations are estimates of phytoplankton biomass
- ¹⁴C bicarbonate uptake rates estimate phytoplankton primary productivity
- HPLC photopigment data were processed with the CHEMTAX matrix factorization program to determine taxa specific phytoplankton biomass



Phytoplankton functional groups and their primary diagnostic photopigments.



Conclusions

- Nitrogen was the sole limiting nutrient of phytoplankton primary productivity and growth in these experiments in PS
- Nutrient limitation in the NRE included N limitation and no nutrient limitation
- PS remained highly nitrogen limited even during the peak riverine nutrient load in the Spring
- Stoichiometric predictions of phytoplankton-nutrient relationships were not always accurate

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